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Cover Photograph: Library Building on the campus of Jacksonville State University, Jacksonville, Alabama, one of sites of the 88th Annual Meeting of the Alabama Academy of Science. Photo is courtesy of Mr. Steve Latham, Jacksonville State University Photographer.

Editorial Comment:

On behalf of the Alabama Academy of Science, I would like to express my deepest gratitude and appreciation for Jacksonville State University for their generous hospitality in hosting the 88th annual meeting of the Alabama Academy of Science.

Safaa Al-Hamdani

Editor: Alabama Academy of Science Journal

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ABSTRACTS

The 88th Annual Academy of Science Meeting Jacksonville State University Jacksonville, AL March 2- March 4, 2011

Anthropology Paper Abstracts

ANCIENT AQABA: THE FAUNAL REMAINS FROM ROMAN AILA. JONATHAN D. LOWREY, DEPT. OF SOCIAL SCIENCES, TROY UNIV., TROY, AL 36082

The primary objective of this paper is to discuss the faunal remains from the ancient city of Aila, in present-day Aqaba, Jordan. Zooarchaeological studies have been increasingly employed in the Levant and have begun to show a subsistence pattern whereby city-dwellers depend heavily on trade with nomadic pastoralists for food. This model is especially prominent in sites near the Jordan River Valley and Wadi Araba. This is evidenced in the faunal remains from Aila, where the remains from significant herds of goats are found, but the environment is too xeric to have supported them. Another objective of this paper is to explore Aila's position in the local economy from a zooarchaeological perspective. The faunal remains were identified by comparing morphological features to Troy University (Troy, AL) Archaeological Research Center's comparative bone collection. Remains were further analyzed by relative age (harvest profiles) and skeletal parts based on analytical categories (carcass part distributions). These methods were employed in studying the faunal remains from Aila. To explore Aila's situation within its region, a number of historical, ethnographic, and archaeological sources were cited. These, along with geographic and environmental information, were used in suggesting likely origins of Aila's goats and the importance of nomadic pastoral trade in the region.

ARCHAEOLOGICAL EXCAVATIONS AT OLD CAHAWBA SUMMER 2010: TRACKING MABILA. JOHN M. BARBAREE, DEPT. OF SOCIAL SCIENCE /ANTHROPOLOGY, TROY UNIVERSITY TROY, AL 36082

The site of Old Cahawba has long been suspected as a potential location for the aboriginal town of Mabila where Hernando DeSoto had an epic battle with Native Americans. However, no verifiable evidence from Cahawba has been found there. In the 1850's, a mass grave was discovered in Old Cahawba town, which may have predated the 1800's, and potentially be associated with the DeSoto Expedition. Based off of a clue from an 1850's newspaper article, Troy University Archaeological Research Center conducted an excavation in an attempt to relocate the reported mass grave. Negative results are still results and this paper presents the findings.

DENTAL DIMORPHISM AND SEXUAL IDENTIFICATION IN FOSSIL PAPIONINS. CURTIS C SCHULTZ AND JASON L HEATON, BIRMINGHAM-SOUTHERN COLLEGE. TROY UNIV., TROY, AL 36082

In the past, non-human primates have been used with some success to infer the mode and tempo of fossil hominid (i.e. human) evolution. This analysis was performed in order to determine if craniodental measurements could be used to predict sex in *papionins* and therefore, possibly applied to fragmentary fossil specimens of closely related taxa. Data (242 craniodental measures) were collected on 120 specimens from the Florida Museum of Natural History and the National Museum of Natural History (Smithsonian Institution). This analysis focused upon finding those dental features that would be most sexually dimorphic among extant species. It was determined that features related to canine size – lower premolar flange length and upper diastema – might be best at predicting sex. Additionally, two extant taxa, *Lophocebus* and *Papio*, were chosen for more detailed analyses, as these are considered to be the groups most similar in size and phylogeny to the South African fossil species to be predicted. Results showed that for large-bodied taxa (e.g. *Papio*) predictions were possible while in the case of smaller taxa (e.g. *Lophocebus*), the lower degree of dimorphism made predictions tenuous. Even when adjusted for body size (i.e. allometric) differences, the results were the same – predictions were best for large taxa with higher degrees of dimorphism. Our results may have wide ranging implications for biodiversity during the Plio-Pleistocene in South Africa with consequences for primate (and possibly hominid) evolution during this period.

ETHNOARCHAEOLOGY OF FIRE FEATURES AND RITUAL IN FIJI'S LAU GROUP. MALLORY MESSERSMITH AND SHARYN R. JONES, DEPT. OF ANTHROPOLOGY, UNIV. OF ALA. AT BIRMINGHAM, BIRMINGHAM, AL 35205.

Food, cooking, and eating have always played a prominent and integral role in Fijian society, especially in the more traditional Lau Group of eastern Fiji. This project examines two central features of Lauan cooking, the hearth and the earth oven. We collected data during two consecutive summers at a NSF REU fieldschool on the island of Nayau, Lau Group, Fiji. We developed a hypothesis for distinguishing between these two types of features in the archaeological record, utilizing archaeological, ethnographic, and historical data. Both feature types are similar in form and contents, and thus difficult to distinguish from one another. Utilizing an ethnoarchaeological approach, we devised several testable criteria for distinguishing the two features: dimensions, depth, amount of fire-cracked rock, and location relative to household structures. The project also examines an unusual case study of a fire feature from a site on Nayau. Although the feature is suspected to be an earth oven, there were several anomalies when compared to the criteria for classification outlined in this project. We also examine evidence for possible uses of this feature, including ethnographic, historical, and archaeological data that may point to a ritualistic or ceremonial purpose. Historical accounts of the region directly following European contact point to the use of earth ovens in association with rituals, including cannibalistic practices. While these rituals are no

longer practiced, analysis of suspected ritual features and comparison with ethnographic parallels of everyday fire features can aid in the recognition of ritual sites.

GATED COMMUNITIES:INSTITUTIONALIZING SOCIAL STRATIFICATION. L.JOE MORGAN, PHYSICAL AND EARTH SCIENCES, JACKSONVILLE STATE UNIVERSITY. 700 N. PELHAM, ROOM 213 MARTIN HALL, JACKSONVILLE, ALABAMA, 36265

The concept and development of “gated communities” and / or privatized spaces has become more pronounced in recent years. These developments have generated a significant amount of interest in academic communities. Many theories and evaluations have begun to surface covering a range of considerations from social inequality to quasi-government organizations providing services and infrastructure for their development. At present there are a limited number of empirical studies. Theories still in development provide a range of perspectives for consideration. The foci for the most recent studies range from an increased concern about metropolitan fragmentation to political incorporation. Socio-economic and demographic segmentation and segregation has been suggested as resulting in a further fragmented social structure. It is believed that this process is exacerbating social ills by creating pockets of economic, cultural, and social within-group homogeneity. These are causing social, cultural, and structural dissimilarities between communities. Conversely, ideals of geopolitical public/private utopian partnerships that reduce crime and increase security while holding down public infrastructural costs, and enhancing tax revenues by increasing property values have been indicated as positive results. Neither of these extremes should be ignored but a significant outcome is an increased stratification of society. Residential enclavism has been reinforced based on a number of variables, including income, social status, race, ethnicity, and fear of crime and/or the criminal element.

HISTORIC CREEK INDIAN OCCUPATIONS ALONG EUPHABEE CREEK, MACON COUNTY, ALABAMA. KELLY M. ERVIN, DEPARTMENT OF GEOLOGY AND GEOGRAPHY, AUBURN UNIVERSITY, AUBURN, ALABAMA 36849.

A recent cultural resource survey conducted in Macon County, Alabama by Auburn University identified two previously unknown archaeological sites (1MC203 and 1MC204) along Eupabee Creek. An analysis of ceramics recovered during the survey suggested both sites were of the early Historic Creek Tallapoosa Phase (1715-1813) characteristic to the Tallapoosa River Valley. The Alabama State Site Files at Moundville document a number of Historic Creek sites located along Eupabee Creek. The recent identification of these archaeological sites along with palynological data from sediment cores taken by the USGS provide evidence to demonstrate a significant Creek Indian occupation of the Eupabee Creek drainage system, and further verify ethnohistorical accounts of the Creeks abandoning major towns and moving up the Eupabee Creek Valley.

HOPE HULL: AN INCIPIENT CHIEFDOM ALONG THE LOWER TALLAPOOSA RIVER VALLEY. HAMILTON H. BRYANT III AND JOHN W. COTTIER PH.D.,

**DEPARTMENT OF SOCIOLOGY, ANTHROPOLOGY AND SOCIAL WORK,
AUBURN UNIVERSITY, AUBURN, ALABAMA, 36849.**

The Terminal Woodland Period of central Alabama was a unique period in the prehistory of the Middle South. During this time, a rapid and pronounced transformation occurred in the life ways of indigenous peoples. The Hope Hull complex is a well established Woodland cultural tradition found along the lower Tallapoosa River Valley. Following multiple lines of evidence, such as fortified villages, maize horticulture, public structures and long distance exchange networks, we posit that the Hope Hull phase represents an incipient chiefdom-level society that developed in situ from local populations.

INTRA-SITE CERAMIC VARIABILITY FROM THE 2010 INVESTIGATIONS AT 1MC25. KATHLEEN BROWN, ERIN MCKINNEY, AND ANNE DORLAND, DEPT. OF ANTHROPOLOGY, SOCIOLOGY, AND SOCIAL WORK, AUBURN UNIVERSITY, AUBURN, AL 36849.

Investigations at 1MC25 demonstrate evidence of a Mississippian fortified village overlying a Woodland site occupation. The purpose of this study is to establish a pre-historic chronology for the site via identifying ceramics from excavation trenches on both north and western boundaries. The intra-site variation corresponding to each of the cultural phases is supported by the results of this analysis. This site has been previously established as a predominantly Mississippian site; however, the results of our study indicate that in at least one area there is more extensive evidence for Woodland than Mississippian occupation.

INVESTIGATIONS INTO A MISSISSIPPIAN HOUSE: AN ARCHITECTURAL ANALYSIS OF A PREHISTORIC DWELLING. RONALD W. WISE JR., AUBURN UNIVERSITY, AUBURN, AL 36849.

Recent excavations at the Ebert Canebreak site (1MC25) revealed evidence of a prehistoric domestic structure. Analysis of the recovered material indicates that it was a semi-subterranean structure between 36 and 49 square feet that was burned and collapsed onto itself. This burning preserved considerable impressions of woven cane as well as at least one puddled clay hearth. Later, a second clay hearth was discovered; separate from the structure, which suggests the presence of a second building near the same location. These elements, in conjunction with the geographical characteristics of the surrounding area, reflect the established pattern of Mississippian sedentism.

PATRICK C. WARING AND THE SEARCH FOR YELLOWSTONE. JOHN W. COTTIER, AUBURN UNIVERSITY, AUBURN, AL 36849.

In 1859, Patrick C. Waring, a young individual with no scientific experience, was invited to be a member of the Captain William F. Raynolds expedition to explore the Upper Yellowstone River country. The guide for the expedition was the legendary mountain man Jim Bridger. The scientific party also included the geologist-naturalist Ferdinand Hayden. This ambitious mission to find Yellowstone failed as a result of a brutal early winter, causing the party to be snow bound at the Deer Creek Agency in modern Wyoming. The youthful

member of the expedition was Patrick C. Waring of Virginia, who wrote very sparingly in his small pocket diary. This is a part of his story to the area considered at the time to be "terra incognita."

SURVIVOR COSTA RICA, 1942 OR WHEN TRUE WILDERNESS REALITY MEETS FAUX TELEVISION REALITY. JAMES SEWASTYNOWICZ, DEPT. OF PHYSICAL AND EARTH SCIENCES, JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265.

The "reality television" craze in the U.S. was largely an outgrowth of the still wildly popular Survivor series which pits "castaways" against both nature and one another, with a prize of \$1 million awarded the winner. The challenges they face in the controlled 'wilderness' environment in which they are placed in many ways mimic those faced over half-a-century earlier by pioneer settlers of the tropical forest of Pejibaye, Costa Rica. There, the stakes were much higher, with not just fortune, but life itself hanging in the balance. This paper examines the social and economic strategies employed by those Costa Rican pioneers by comparing their gaming behavior to that of their television counterparts.

TALLADEGA NATIONAL FOREST ARCHAEOLOGICAL DATABASE: GIS AIDS MANAGEMENT. MIRIAM HELEN HILL, DEPT. OF PHYSICAL AND EARTH SCIENCES, JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265.

The Talladega National Forest currently has 743 archaeological sites on record ranging from Paleoindian through historic. Land and resource management issues frequently require the identification of potentially impacted sites and knowledge about their size and characteristics. Geographic Information Science can supply the needed information quickly and effectively. A spatial database using ArcGIS from ESRI is being compiled that displays the site locations either as points or as polygons portraying the relative size of the site. Each site is linked to a table providing additional data. For the 143 sites investigated by the Archaeology Resource Laboratory at Jacksonville State University, hotlinks in these tables will provide, with a mouse click, either the detailed site map or the actual report document in .pdf format. This database draws together data which previously have been dispersed and difficult to access and displays previously unmapped spatial variables. This tool will facilitate management decision making enabling improved land and resource management.

Behavioral and Social Sciences Paper Abstracts

UTILIZATION OF LANDSCAPE ARCHAEOLOGY ALONG THE OLD FEDERAL ROAD. MATT GREENEMEIER, DEPT. OF SOCIOLOGY, ANTHROPOLOGY AND SOC. WORK, AUBURN UNIV., AUBURN, AL 36849

Building upon the precursors of spatial analyses and broader studies of settlement patterns, a modern utilization of landscape archaeology can identify even more geographically dispersed trends of human-environmental adaption and inter-cultural interaction. More specifically, in

the examination of the early 19th century Old Federal Road within Alabama's Macon and Russell counties, differential access to advantageous real estate produced areas of dispute and exchange between native and American populations. Through the correlation of aerial photography with historic period maps, previously known archaeological sites can be appreciated through a broader landscape focus, and the localities of new sites can be predicted, ascertained, and ultimately protected for future research. Additional implementation of GIS methodologies and a consultation of primary and secondary resources serve to expand upon cultural realities of rural Alabama in the early 1800s.

A MATTER OF TRUST: A CASE STUDY ON DECISION MAKING UNDER PRESSURE. R. BRYAN KENNEDY, MICHAEL ESSARY, SUSAN D. HERRING, THOMAS PIELOW, AND LINDA SHONESY, ATHENS STATE UNIVERSITY, ATHENS, AL 35611.

This case study addresses a very difficult military decision faced by Great Britain early in World War II. Discussions of some of the very delicate issues including possible alternative approaches that could have been chosen rather than the one selected are presented. Aftermath effects of the decision and immediate consequences are addressed as well as long range consequences occurring later in the war. The study addresses the universal issue that it is sometimes necessary for followers to place unlimited trust in leaders to ensure the goals of the organization are achieved.

A PRELIMINARY INVESTIGATION OF THE FUNDAMENTALIST CARD SORT - PHASE II. SARA M. LAZENBY-BLasingame, AMY L. VOSBURGH, HAZAR SARIGUL, KARLY A COCHRAN, ASHLEY N. JOHNSON, SARAH E. FREED, RICHARD A. HUDIBURG, AND LARRY W. BATES, DEPARTMENT OF PSYCHOLOGY, UNIVERSITY OF NORTH ALABAMA, FLORENCE, AL 35632

In order to determine whether religiously taboo images elicit cognitive interference in religious fundamentalists, seventy nine university students participated in a study to determine whether image differences on a modified Wisconsin Card Sort Test affected performance. These images had been determined by previous research as offensive to religious fundamentalists but not offensive to nonfundamentalists. Participants completed a battery of religious questionnaires via a SurveyMonkey website. Based on the responses to the Religious Fundamentalism Scale - Revised, a median split was used to divide the sample into high fundamentalism (hiRF) and low fundamentalism (loRF) groups. Participants were assigned randomly to complete either the Wisconsin Card Sort Test, with standard card stimuli, or the Fundamentalist Card Sort Test, with altered card stimuli. Mixed-design ANOVAs were used to compare lo- and hi-RF groups across card sort tests for time to complete first set, total number of errors, unambiguous errors, and ambiguous errors. There were no significant differences between groups or between tests and no interaction effect. Correlational results for other variables are also provided.

FUNERAL LEAVE: A CASE STUDY ON ATTENDANCE POLICY. R. BRYAN KENNEDY, MICHAEL ESSARY, SUSAN D. HERRING, LINDA SHONESY, AND TERESA WANBAUGH, ATHENS STATE UNIVERSITY, ATHENS, AL 35611.

This case study examines the termination of a long term employee for failure to meet no-fault work place attendance requirements. The employee was terminated after taking leave to plan and attend the funeral of a person who was living in the employee's home at the time of death. By taking these three days of leave, the employee exceeded the number of days permitted by the attendance policy. Issues include whether management had followed the procedures set forth in the policy, and whether the decedent met the definition of "immediate family member."

NEW TECHNOLOGY, OBSERVATIONAL LEARNING, AND INFLUENCE ON ATTITUDES. R. BRYAN KENNEDY, SUSAN D. HERRING, JANET DORNING, LAURA LYNN KERNER, LINDA SHONESY, AND DEBRA VAUGHN, ATHENS STATE UNIVERSITY, ATHENS, AL 35611.

This paper examines the application of observational learning research on developing attitudes and actions. Experts in pedology have stressed the importance of pro-social, positive modeling on the behavior and development of children and, to a lesser extent, on older adults. It would be safe to assert that many organizational training programs incorporate positive modeling as an important learning/training experience for their participants. This study focuses on the increased occurrence of violence in the U. S. and considers the possible effect of antisocial modeling as presented through new technology and media on this increase.

SAFETY IN SCHOOLS. IDENTIFYING AREAS OF SCHOOL SAFETY CONCERN: THE RELATIONSHIP BETWEEN STUDENTS, FACULTY MEMBERS, AND ADMINISTRATION RESPONSES CONCERNING SCHOOL SAFETY AND PREPAREDNESS. JIM D. ROEBUCK, III

This study tested the school's preparedness to correctly manage emergency situations and educate the students. The research hypothesis tested was to determine that the school is not adequately prepared to follow school procedures if there are contingencies due to emergency parameters changing. The hypothesis tested was: Is there an independent nature among responses of confidence levels during a school emergency situation? An independent nature will show scattered levels of confidence during a school emergency situation. Through the use of this study, the school identified which areas were the weakest. The research study was conducted in a 3A high school located in the southeastern region of the United States that houses 7th – 12th grade students and currently has an enrollment of 517. A sample size of 177 students, 32 faculty members, and 2 administrators was sufficient to guarantee a confidence level of 99%. The results of the study showed that if the parameters are changed, the school administration, faculty, and students are prepared to follow correct school procedures. The results did, however, find there are certain procedures, that when under normal conditions, the school is not prepared. These situations were identified by examining the situations where students lacked confidence.

THE WIRELESS GAME: A CASE STUDY ON DECISION MAKING IN WARTIME. R. BRYAN KENNEDY, KIMBERLY BELL, SUSAN D. HERRING, *JAMES KERNER*, CHARLES ROBERTS, AND LINDA SHONESY, ATHENS STATE UNIVERSITY, ATHENS, AL 35611.

This case study addresses a very difficult decision faced by Great Britain's military leadership during World War II in their continuing intelligence efforts to confuse the German high command concerning the D-Day attack. The "wireless game" was utilized by both sides and depended upon the discovery and capture of undercover wireless agents. Agents working undercover gathered and transmitted all types of secret information concerning troop movements, battle plans, etc. The British relied on certain checks to determine if a post had been captured. With the capture of an agent and the wireless equipment, the transmission of deceptive information could begin. If the decision were made to send relief agents to a captured post, it meant the new agents eventually would be arrested and perhaps executed. The British dilemma can be summed up as follow: Is it ethical to sacrifice the lives of a few undercover agents to help save the lives of hundreds, potentially thousands, of Allied soldiers on the beaches of Normandy?

USING PERSONALITY TYPE TO ENHANCE TEACHING AND LEARNING. R. BRYAN KENNEDY, SUSAN D. HERRING, *LAURA LYNN KERNER*, LINDA SHONESY, AND MELISSA WERNER, ATHENS STATE UNIVERSITY, ATHENS, AL 35611.

This paper presents information concerning the possible effects of personality preferences on teaching and learning styles. Special permission was granted in writing by the Center for Applications of Psychological Type (CAPT), Gainesville, FL for extensive summaries of type information from "People, Types and Tiger Stripes" by G. D. Lawrence. No original research was conducted by the authors of this paper.

Behavioral and Social Science Poster Abstracts

OBESITY, BODY IMAGE, AND HEALTH IN NAYAU, LAU GROUP, FIJI. *SHARYN R. JONES*, LORETTA A. CORMIER, CAITLIN AAMODT, COURTNEY ANDREWS, CHRISTEL CARLISLE, HELENA CORCÃO, ANNA MCCOWN, MALLORY MESSERSMITH, MEGAN NOOJIN, LINDSAY WHITEAKER, AND ASHLEY WILSON. DEPT. OF ANTHROPOLOGY, UNIV. OF AL AT BIRMINGHAM, 35294.

In the past, indigenous Fijians have valued large body sizes as physically attractive, healthy, and signs of high social status. Obesity has been an aesthetic preference and in a sense, a form of body art. Nayau is a remote island in the Lau Group Fiji with a population of approximately 350 individuals who largely practice traditional methods of fishing and gardening subsistence. Over the last five years, the Nayau population has experienced increased exposure to Western media and Western material culture. Electricity, television reception, and DVD movie players are very recent introductions. In the summers of 2009 and 2010, under an NSF-funded REU (Research Experiences for Undergraduates) we gathered

quantitative (BMIs, random spot checks, body image surveys) and qualitative data (interviews, health data, and participant observation) to assess weight (underweight, normal, overweight, obese), activity patterns, and perceptions of body image. We address not only potential changes in Fijian construction of the ideal body type in the wake of Western exposure, but also use data from Nayau to present challenges to the biomedical paradigm that obesity should be universally considered to be an unhealthy disease state.

BUSKING AND RELIGION: ATTITUDES AND BEHAVIORS. JOHN O. LEMAY IV, KRISTOPHER A. COCHRAN, SARAH E. FREED, KARLY A. COCHRAN, CALEB C. FARRIS, AND LARRY W. BATES, DEPT. OF PSYCHOLOGY, UNIVERSITY OF NORTH ALABAMA, FLORENCE, AL 35632.

To examine conceptions of religion and charity a total of 102 undergraduate students at a regional university in the southeastern US completed a battery of surveys regarding religion, and attitudes and behaviors toward busking. Participants were separated according to a median split of Religious Fundamentalism Scale Revised scores into Low Religious Fundamentalism (loRF) or High Religious Fundamentalism (hiRF) groups, with scores falling on the median randomly assigned to either group. This resulted in 50 participants being classified as loRF and 52 as hiRF. Independent t-tests were used to compare age, sex, and religious attendance, frequency of prayer, and attitudes and behaviors towards buskers. The hiRF group attended religious services much more often per year and engaged in prayer more times per week than the loRF group. Additional correlational analyses among the data found that extrinsic-personal orientation viewed busking as more entertaining while extrinsic-social orientation viewed busking as more irritating. The purpose of this research is to bring together the concepts of religion and charity in a new light, through busking, in a preliminary study to scrutinize how religion affects one's attitudes in general and specifically toward giving to buskers.

CORRELATING GUILT AND SHAME PRONENESS AND FREQUENCY WITH SELF-REPORTED AND BEHAVIORAL MEASURES OF IMPULSIVITY. DAJUAN FERRELL, HEIDI L. DEMPSEY, DAVID W. DEMPSEY, JOHN SUDDUTH, SETH MARTIN, MORGAN WHETSTONE, ELIZABETH USSERY, & SAMANTHA MORTON, DEPARTMENT OF PSYCHOLOGY, JACKSONVILLE STATE UNIVERSITY, 700 PELHAM RD. N, JACKSONVILLE, AL 36265.

The purpose of this study was to determine whether there was a correlation between guilt and shame proneness and frequency with self-reported impulsivity. This study utilized the Barratt Impulsiveness Scale, Harder's Personal Feelings Questionnaire, and Eyre's Shame and Guilt Inventory to measure the responses of participants. Results indicated that participants did not discriminate well between the guilt and shame subscales and that they two measures of guilt and shame were only moderately correlated with each other. However, the PFQ-2 shame frequency was moderately correlated with overall impulsiveness and each of the impulsiveness subscales. PFQ-2 guilt frequency was moderately related to overall impulsivity and non-planning impulsiveness. The SAGI measure of guilt and shame proneness was unrelated to any of the impulsivity scales. Future research should investigate why

impulsiveness is related to shame frequency more than guilt frequency and why proneness to guilt and shame does not predict an individual's trait impulsiveness level.

CORRELATIONS BETWEEN EFFORT DISCOUNTING, GRADES, ACADEMIC DELAY OF GRATIFICATION, LOCUS OF CONTROL, AND NEED FOR COGNITION. MORGAN WHETSTONE, HEIDI L. DEMPSEY, DAVID W. DEMPSEY, SAMANTHA MORTON, DAJUAN FERRELL, SETH MARTIN, JOHN SUDDUTH, AND ELIZABETH USSERY, DEPT. OF PSYCHOLOGY, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265.

The present study involved a statistical evaluation of the relationships between four established personality constructs—Academic Delay of Gratification, Locus of Control, Need for Cognition, and the Barratt Impulsiveness Scale-11—and those between effort discounting and academic success of undergraduate students. As hypothesized, Academic Delay of Gratification, Locus of Control, and Need for Cognition were each negatively correlated with the Barratt Impulsiveness Scale-11. However, an unexpectedly weak relationship was observed between effort discounting rates and academic scores. Future research should be carried out to assess the external validity of the findings across different age groups or populations, as well as settings beyond academia.

DISASTER PREPAREDNESS AND FAMILIES OF CHILDREN WITH SPECIAL NEEDS. LORETTA A. CORMIER, LISA R. BAKER, COURTNEY ANDREWS, SUMER CHAMBLESS, DANIELLE HESSE, AND CHARLENE RHOADES. DEPT. OF ANTHROPOLOGY AND SOCIAL WORK, UNIVERSITY OF ALABAMA AT BIRMINGHAM, 35294.

While there is a growing literature base demonstrating that the general public is not personally prepared for the immediate events after a disaster, extremely little information is available identifying reasons why people are not prepared or addressing family disaster preparedness, especially among vulnerable populations. Our project is a research study and student-training program that evaluated family disaster preparedness among vulnerable populations. The study utilized a mixed-methods approach, combining the complementary areas of expertise of the investigators quantitative and qualitative methods. Quantitative data was derived from 1) a survey with a pre-test post-test quasi-experimental design to collect data on preparedness 2) the administration of a brief psycho-educational intervention aimed at increasing levels of preparedness among two high risk populations of families with children who have special healthcare needs. Qualitative data was derived from semi-structured interviews with data analyzed through the constant comparison method. The populations included 1) families in an urban medical setting receiving health care from Children's Hospital of Alabama, and 2) families in a high hurricane risk coastal region receiving health care from the Children's Diagnostic and Treatment Center of Broward General Hospital, Fort Lauderdale, Florida. We discuss our findings in terms of 1) why families are not adequately prepared for disaster, 2) regional differences in preparedness among vulnerable pediatric populations, 3) and the results from an on-site educational intervention.

EXAMINING THE RELATIONSHIP BETWEEN STUDY DISTRACTORS, PROCRASTINATION, AND IMPULSIVITY. *ELIZABETH USSERY, HEIDI DEMPSEY, DAVID DEMPSEY, SETH MARTIN, SAMANTHA MORTON, DAJUAN FERRELL, JOHN SUDDUTH, MORGAN WHETSTONE, DEPARTMENT OF PSYCHOLOGY, JACKSONVILLE STATE UNIVERSITY, 700 PELHAM RD. N, JACKSONVILLE, AL 36265.*

The goal of the current study was to examine the relationship between study distractors, procrastination, and impulsivity, and relate these to course performance in psychology courses and overall GPA. Results indicated that impulsivity, procrastination, and study distractors were not generally related to course performance or GPA. However, impulsivity and procrastination were significantly related to a number of common study distractors that students might encounter (e.g., other people talking, TV, internet, amount of coursework). Future research should examine why impulsivity, study distractors, procrastination were not good predictors of course performance or GPA.

FRAMING OF COST/BENEFIT ANALYSIS QUESTIONS AND THE RELATIONSHIP TO MEASURES OF IMPULSIVITY. *SAMANTHA MORTON, HEIDI L. DEMPSEY, DAVID W. DEMPSEY, ELIZABETH USSERY, JOHN SUDDUTH, SETH MARTIN, MORGAN WHETSTONE, & DAJUAN FERRELL. JACKSONVILLE STATE UNIVERSITY*

This is an exploratory study which looks at how students rated a variety of questions relating to decisions they may have to make as they enter the workforce. For example, students are asked a series of questions regarding how many hours they would work a week for a variety of salaries. Also, they are asked how far they would move away from their families/friends in order to get good paying job. Finally, each student's decisions were correlated with their trait impulsivity level. Results indicated that some decisions were correlated with impulsivity, but the majority were not. Also, not all decisions followed a rational cost/benefit analysis. Discussion focuses on how students' lack of understanding of numbers (innumeracy) may affect their ability to make rational decisions.

MAGNITUDE EFFECTS AND STABILITY OF RESPONSES IN A MEASURE OF DELAYED DISCOUNTING OF MONEY. *JOHN SUDDUTH, HEIDI DEMPSEY, DAVID DEMPSEY, DEJUAN FERRELL, SAMANTHA MORTON, ELIZABETH USSERY, MORGAN WHETSTONE, & SETH MARTIN*

The current study examined the relationship between delayed discounting of hypothetical money and effort discounting of hypothetical extra credit points. Both money and extra credit showed evidence of magnitude effects, such that larger amounts were discounted less than smaller amounts. With regard to stability of answers, there were high correlations between all of extra credit discounting questions and their duplicates, but not for the monetary discounting measures. The discussion speculates as to why money showed different results than extra credit.

MICRO-STRATIFICATION: EFFECTS OF URBAN PLANNING POLICY ON PUBLIC HOUSING COMMUNITIES. HOLLY PARK, DR. L.JOE MORGAN, DEPARTMENT OF PHYSICAL AND EARTH SCIENCES, GEOGRAPHY, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265.

The institutionalization of gated public housing is stratifying an already marginalized community. In this research we are analyzing the census data from 2000 to show the inverse correlation between the index of social structure (social segregation) in relation to the distance from the gated public housing. The gate super-imposes an imagined carceral state to a population that already faces economic hardships. We propose that in confining these residents to the gated property, they are being forced to live out the stereotypical image of criminals behind bars. Most of the population within these gated housing properties is young African-American women, with no spousal support. When gating is combined with the lower income and education levels, negative image of the public housing communities is deepened. The greater the disparity in the index of social structure, the greater the spatial segregation between communities. The impact of gating creates an air of social marginalization leading to an increase of urban inequality. Research has shown that gating socially marginalized communities has led to negative externalities and unintended consequences. The intergroup relationships resulting from the micro-stratifications of population have led to greater between group disparities. In many cases such as Anniston and Gadsden, AL, gating has been funded and planned by local law enforcement agencies and supported by the Department of Housing and Urban Development (HUD). This project is evaluating the further segregation and marginalization of certain segments of population based on spatial distribution of economic class directed by the government policies.

AREA UNDER THE CURVE FOR DOUBLE LIMIT AND MULTIPLE CHOICE MEASURES OF TEMPORAL DISCOUNTING

The current study examined the relationship between temporal discounting, perceived to be a behavioral measure of impulsivity, and survey measures of impulsivity, and magnitude effects of dollar amount. Participants completed either a commonly used, but time-intensive, computerized method of delayed discounting (the double-limit method), or they completed two new, less time-intensive, multiple-choice based methods (the four-question multiple choice or the single-question multiple choice) to determine if the multiple choice method would be a viable substitute for the more cumbersome double-limit method. Results indicated that the multiple choice methods were not an adequate substitute for the double-limit method. The discussion focuses on why these methods may not be equivalent and future directions for research in this area.

Bioethics, History and Philosophy of Science Paper Abstracts

EVOLUTION AND RELIGION: PARALLELS, PROBLEMS, AND HISTORIES. SAMUEL J HIRT, PHD STUDENT, DEPT. OF BIOLOGY, AUBURN UNIVERSITY, AUBURN, AL 36849.

The development of the theory of evolution illustrates problems associated with applying unique philosophies and their objectives outside of their realm. Although a definition of science that satisfies all scientists may be impossible, most would agree that its objectives are to provide evidence for or against materialistic hypotheses via the scientific method. Equally as hard to define, most would agree that the objectives of religion would include the development of faith through revelation to the means of exaltation or enlightenment. Perhaps in attempts to rectify perceived contradictions among the two philosophies and despite fundamental differences in methodology, many scientists and religious figure heads have tried to extend their philosophy into the other realm. Herein I highlight some similarities in the philosophies of science and religion to illustrate how easily this can be done and use the development of the theory of evolution as a historical and current example of how this mistake is damaging to both philosophies. In conclusion, I offer for a solution respect and understanding of each philosophy and maintain that the separation of church and state will help achieve the purposes of both science and religion.

PLURIPOTENT STEM CELLS: FINALLY AN ETHICALLY UNCONTROVERSIAL SOURCE? JAMES T. BRADLEY, DEPT. OF BIOLOGICAL SCIENCES, AUBURN UNIVERSITY, AUBURN, AL 36849.

Pluripotent stem cells can give rise to all cell types in the adult individual, thus their clinical potential for treating conditions ranging from strokes and spinal cord injuries to diabetes and Parkinson's disease. The major source of pluripotent cells since 1998 has been surplus blastocyst stage embryos obtained from in vitro fertilization clinics. But using human blastocysts for ESCs is controversial because many people consider blastocysts to be persons with a moral right to life. In 2007, induced pluripotent stem (iPS) cells were generated from skin cells by introducing extra copies of certain genes into the cells. Safety considerations limit the clinical value of iPS cells. In 2010, adult cells were reprogrammed to pluripotency without altering their genomes. Characteristics of these RNA-induced pluripotent stem (RiPS) cells and their ethical implications are discussed.

SCIENCE AND MYTHOLOGY: DUAL BELIEF SYSTEMS? CLARK E. LUNDELL*, DEPT. OF INDUSTRIAL DESIGN AND *JAMES T. BRADLEY, DEPT. OF BIOLOGICAL SCIENCES, AUBURN UNIVERSITY, AUBURN, AL 36849.

Is Science the Mythology of the 21st Century? A biologist (Bradley) and a designer (Lundell) present a dialogue documented over years of conversation on the question: Do the heroes of modern science, Einstein, Tesla and Newton, assume the role of Jupiter, Juno and Minerva in our contemporary Capitoline Triad? Are they as fallible? These questions are explored through conversation that invites contemplation, seeks to challenge the irrefutable nature of

contemporary science (Lundell), and strives to explicate distinguishing characteristics of the scientific enterprise (Bradley).

THE MORAL RESPONSIBILITY OF SCIENTISTS. *GERARD ELFSTROM*, DEPT. OF PHILOSOPHY, AUBURN UNIVERSITY, AUBURN, AL 36849-5210

Scientists in laboratories are commonly the first to become aware of new discoveries that may harm other human beings. These researchers will also be best situated to determine what harms these discoveries may bring and how they may do so. In consequence, these scientists should accept the moral obligation to prevent others from being harmed as a result of their discoveries. However, individual scientists are hampered by several factors: There are no commonly accepted guidelines they may consult to determine which discoveries are likely to cause significant harm to others, and there are no bodies able to give them guidance on such matters. Also, they can do no more than alert others to dangers. They cannot take additional action to prevent harm from coming to others. Hence, alerts from scientists must be the first step to protect human beings and not the last. Relevant institutions, whether governmental, academic, or commercial have the additional obligations of devising workable guidelines, establishing consulting agencies, and putting means in place to protect the public from harm. Without these additional measures, the actions of individual scientists must be ineffectual.

Bioethics, History and Philosophy of Science Poster Abstracts

THE MISCONCEPTION OF HEALTH DISPARITIES. *SHERYCE C. HENLEY*, SONNI-ALI MILLER, FLOYD DAVIS, CEDRIC LANE, CHRISTOPHER RAGLAND, WILL TARVER, DR. TIMOTHY TURNER PH.D. DEPUTY DIRECTOR OF RESEARCH AND TRAINING TUSKEGEE UNIVERSITY NATIONAL CENTER FOR BIOETHICS IN RESEARCH AND HEALTH CARE BIOETHICS BUILDING TUSKEGEE, AL 36088

The late Dr. Martin Luther King Jr. in his letter from Birmingham Jail said an “injustice anywhere is a threat to justice everywhere.” To consider this quote and look upon the burgeoning problem of health disparities, one must actively look the problem squarely in the face and call it what it is —prejudice. Health disparities occur from sequences of events that begin with inequalities established by human judgments. These human prejudices create real inequalities in the human experience and lead to the differences observed in the health status of certain populations. Although the current definitions of health disparity provide the measurement of the terminal differences in health status, it makes no attempt to evaluate the causative factors. Particular focus on the African American community reveals many different inequalities that contribute to the higher levels of disease conditions such as high blood pressure, diabetes, and cancer. Inequalities in income, insurance coverage, accessibility to and quality of health care create the stresses that are all major contributors to observed disparities in health. The perception is that minorities usually fall within the lower percentile for income, have little or no health insurance coverage, and their healthy lifestyle practices are subordinate to other races. However, even global analysis reveals that predominantly non-white nations have observably lower health status than their white counterparts. Thus, the

purpose of this work is to provide an exhaustive meta-analysis and conceptual framework for initiating the hard discussions of the underlying factors causing health disparities.

Biological Sciences Paper Abstracts

ANURAN CALL ACTIVITY AT AN EPHEMERAL POND IN NE ALABAMA: A PRELIMINARY ANALYSIS. *BRETT A. MACEK* AND *GEORGE R. CLINE*, DEPT. OF BIOLOGY, JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265.

We studied calling activity over a 5-month period at Frog Pond, near White Plains in NE AL in 2010. Eight species, representing 3 Families, were recorded at the site. Hylid frogs dominated the site (5 sp.) followed by Ranids (2 sp.) and Microhylids (1 sp.). All species recorded were accounted for within the first 3 months of the study. Not all species called simultaneously. In this study, hylids dominated calling activity early in the season. *Pseudacris crucifer* called first, followed by *Hyla gratiosa*, *H. chrysoscelis*, *A. crepitans*, and *H. cinerea*. Ranid frogs called next, followed by Microhylids. Early in the study, only 1-4 species called. Daily calling activity peaked with 6-7 species calling in May. Calling activity dropped off in June as drought conditions progressed. A late-season spike in calling activity correlated with a rainfall event in July. Intensity of calling activity was measured using the Wisconsin Frog and Toad **Survey** (WFTS), which assigns calls to index values on a scale ranging from 1-3 for each species. When viewed over the entire breeding season, several calling patterns were observed. Some species jumped to level 3 calling immediately once calling commenced, and remained high throughout the season. Several species remained sporadic throughout the season, while others remained at moderate calling intensities throughout the calling season.

BACTERIAL DIVERSITY OF AN INDIAN CREEK SAMPLE AS REVEALED THROUGH 16S RRNA SEQUENCING. *JESSICA NASH* AND *CHRIS OTTO*, DEPT. OF BIOLOGY, ATHENS STATE UNIV., ATHENS, AL 35611.

There is microbial life in almost every environment on earth. With the techniques involved in metagenomic sequencing it is now possible to identify the organisms that are either unable to be grown on plates or seen with the naked eye. The process involves extracting DNA, replicating, and integrating microbial DNA from many sources into a vector able to be cloned without the need to culture the organisms. The libraries resulting from these clones are sequenced, and with analysis using available online classification programs, microbes are able to be discovered and classified. Throughout the years this has led to many instrumental advances in medicine, from antibiotic resistance to available new enzymes. In this experiment, an Indian Creek water sample was tested using typical protocols and procedures of metagenomics. The results throughout the experiment continuously showed evidence that DNA extraction took place, and sequencing was successfully performed. The concentration of DNA in the cloned libraries was high enough that classification of returned sequences was able to be executed through the online databases greengenes, National Center for Biotechnology Information, and Ribosomal Database Project.

CANOPY GAP DYNAMICS IN MATURE, MESIC, QUERCUS STANDS ON THE CUMBERLAND PLATEAU, ALABAMA. JACOB D. RICHARDS, AND JUSTIN L. HART, DEPT. OF GEOGRAPHY, UNIV. OF ALA., TUSCALOOSA, AL 35486.

Gap scale disturbances are important processes in forest stand development in the southern Appalachians. Canopy gaps within secondary forest throughout the southern Appalachians have been documented as critical mechanisms in canopy tree replacement and stand regeneration. I quantified gap characteristics, gap formation and closure mechanisms, and intra-gap tree and sapling distribution patterns for 60 canopy gaps in secondary mesic, *Quercus* stands on the Cumberland Plateau in north Alabama. Snag-formed gaps were the most common. The projected closure mechanism was significantly related to the area of the gap whereby smaller gaps usually closed via lateral crown expansion and larger gaps typically closed by subcanopy recruitment. Based on the results, I hypothesized that gaps exceeding 200 m² had higher probabilities of closing via subcanopy recruitment rather than lateral crown expansion. Several gaps projected to close by subcanopy recruitment were doing so through *Quercus* capture. However, *Quercus* capture of gaps was restricted to upper slope positions with low understory competition from shade tolerant species and adequate light levels. The majority of gaps were projected to close via lateral crown expansion. Based on the composition of saplings and trees in gap environments, I project the forest to transition from a *Quercus* dominated system to one with much stronger *Fagus grandifolia* and *Acer saccharum* components. My study fills a void in the literature on the role of canopy gaps in secondary, mesic *Quercus* stands that established just prior to 1900 for the southern Appalachian region.

CHECKLIST OF THE MAMMALS AT RUSSELL CAVE NATIONAL MONUMENT IN JACKSON COUNTY, ALABAMA. ANTHONY C. GROW, DANIEL M. WOLCOTT, AND MICHAEL L. KENNEDY, THE UNIVERSITY OF MEMPHIS, DEPARTMENT OF BIOLOGICAL SCIENCES, MEMPHIS, TN, 38152.

A checklist of the mammals at Russell Cave National Monument (RCNM) in Jackson County, Alabama, was compiled during a survey conducted in the summer and fall of 2009 and spring of 2010. Sampling procedures included live trapping, bait/camera stations, scent stations, mist netting, spotlight surveys, and general observations. Twenty-nine species, representing 8 orders and 14 families, were verified to occur on the site. Results reflected the presence of 1 species of opossum (*Virginia Opossum*, *Didelphis virginiana*), 1 species of shrew (Northern Short-tailed Shrew, *Blarina brevicauda*), 1 species of mole (Eastern Mole, *Scalopus aquaticus*), and 6 species of bats (Gray Myotis, *Myotis grisescens*; Northern Myotis, *Myotis septentrionalis*; Tri-colored Bat, *Perimyotis subflavus*; Big Brown Bat, *Eptesicus fuscus*; Eastern Red Bat, *Lasiurus borealis*; and Evening Bat, *Nycticeius humeralis*). Other species documented included: Nine-banded Armadillo (*Dasypus novemcinctus*), Eastern Cottontail (*Sylvilagus floridanus*), 11 species of rodents (Eastern Chipmunk, *Tamias striatus*; Woodchuck, *Marmota monax*; Eastern Gray Squirrel, *Sciurus*

carolinensis; Southern Flying Squirrel *Glaucomys volans*; American Beaver, *Castor canadensis*; White-footed Deermouse, *Peromyscus leucopus*; Cotton Deermouse, *Peromyscus gossypinus*; Hispid Cotton Rat, *Sigmodon hispidus*; Allegheny Woodrat, *Neotoma magister*; Woodland Vole, *Microtus pinetorum*), Domestic Dog (*Canis familiaris*), Coyote (*Canis latrans*), Gray Fox (*Urocyon cinereoargenteus*), Raccoon (*Procyon lotor*), Eastern Striped Skunk (*Mephitis mephitis*), Feral Cat (*Felis catus*), and White-tailed Deer (*Odocoileus virginianus*). One endangered species (Gray Myotis) was recorded during the survey.

**DISCOVERING MYCOBACTERIOPHAGE CRYPTKEEPER. KRISTEN CARLISLE
DR. LAJOYCE DEBRO AND DR. CHRISTOPHER MURDOCK, DEPARTMENT OF
BIOLOGY, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL**

Over the past century, scientists have been working together in efforts to further knowledge of the Mycobacteriophage population throughout our planet. It is hoped that the obtained knowledge of this microscopic agent will lead to the production of vaccines and new medical treatments for antibiotic resistant bacteria, as well as lead to advancements in biological warfare weaponry. Knowledge of the Mycobacteriophage population is being expanded by the collection and characterization of new viruses. Mycobacteriophage can be found in a variety of locations. My objective was to answer the question, "Is it possible to discover a Mycobacteriophage from an environmental sample collected from a cemetery in Ragland, Alabama?" To answer this question, I enriched an environmental sample using host bacterium *Mycobacterium smegmatis* and purified a Mycobacteriophage from the mixture. Analysis of the physical and genetic properties of the isolate, Cryptkeeper, support our conclusion that this is a newly discovered virus.

**DISTRIBUTION OF AMPHIANTHUS PUSILLUS AND DIAMORPHA SMALLII IN
ALABAMA DAVID M. FRINGS AND L. J. DAVENPORT SAMFORD UNIVERSITY,
800 LAKESHORE DRIVE, BIRMINGHAM, AL. 35229.**

SPECIAL INSTRUCTIONS: Indent first sentence for beginning paragraph. Indent second paragraph beginning with the third sentence and the word "Amphianthus". Indent third paragraph beginning with the fifth sentence and the word "Diamorpha". Indent the fourth paragraph beginning with the last sentence and the word "Both". All scientific name, genus and species should be in italics.

Diamorpha smallii and *Amphianthus pusillus* are two annual plants that germinate and complete their lifecycles from late fall until early spring. Both species inhabit pools and depressions on isolated rock habitats of Alabama. *Amphianthus pusillus* is found in small vernal pools on granite outcrops of Alabama, Georgia, and South Carolina. Its range in Alabama is restricted to two isolated outcrops of Randolph and Chambers counties; two colonies are reported for Chambers County and for colonies for Randolph County.

Amphianthus pusillus is listed by the U. S. Fish and Wildlife Service as an endangered species. This species germinates and blooms during the late winter. *Diamorpha smallii* is found in moist shallow depressions and vernal pools on granite outcrops of the Piedmont

Province and similar sandstone habitats in the Valley and Ridge Province. Its range covers portions of Alabama, Georgia, Tennessee, North Carolina, South Carolina, and Virginia. The Alabama range of *D. smallii* includes Chambers, Lee, Tallapoosa, Randolph, Etowah, DeKalb, and Tuscaloosa counties. This species germinates in the late fall and blooms during the early spring.

Both species appear to be declining in Alabama due to loss of habitat from mining, logging, illegal dumping, and the use of four-wheel vehicles

FINDING MOMO AND FLO: THE ISOLATION AND CHARACTERIZATION OF MYCOBACTERIOPHAGE. JESSICA L. ARIGHI, REBEKAH YOUNG, LAJOYCE DEBRO, AND CHRISTOPHER MURDOCK, DEPT. OF BIOLOGY JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL

SPECIAL INSTRUCTIONS: Italicize *Mycobacterium smegmatis*, *M.smegmatis*, and *Mycobacterium tuberculosis*

Viruses that infect bacteria were discovered in 1915 and are known as “bacteriophages” or “phage” for short. Bacteriophages must have a host bacterium to replicate and have the potential to control bacterial growth, which could lead to an alternative for antibiotics. The goal of this project was to find Mycobacteriophages and begin to characterize them by their physical and genetic properties. A Mycobacteriophage is specific to Mycobacterium. In this study, the host bacterium was *Mycobacterium smegmatis*. *M. smegmatis* is very similar to the bacteria which cause the deadly disease tuberculosis, *Mycobacterium tuberculosis*. Soil samples were taken from Dadeville, Alabama, and Rome, Georgia, and enriched to help the phage grow. After multiple rounds of purification, one single bacteriophage was isolated from each sample. The initial characterization of the two Mycobacteriophages found, MomoMixon and Florence, supports our conclusion that they are newly discovered isolates. This research was supported by the Science Education Alliance of the National Genomic Research Initiative of the Howard Hughes Medical Institute and Jacksonville State University - Biology Department.

IDENTIFICATION OF NEW COMPONENTS INVOLVED IN SHOOT GRAVITROPISM IN ARABIDOPSIS THALIANA. ARCHANA SHARMA, JOANNA DILLER, DEPARTMENT OF BIOLOGICAL SCIENCE, AUBURN UNIVERSITY, AUBURN, ALABAMA 36849.

SPECIAL INSTRUCTIONS: Following words should be italic: *Arabidopsis thaliana* , SCARECROW (SCR), scr , 35S::SCR , 35S::SCR/scr1 , 35S::SCR/WT

In *Arabidopsis thaliana*, SCARECROW (SCR) gene is essential for normal radial patterning and shoots gravitropism. The SCR mutants exhibit shoot agravitropism and defective radial pattern. The most favored hypothesis is “starch-statolith hypothesis” but the precise molecular mechanism of gravitropism is still unknown. We identified scr mutant suppressors to generate tools to answer following questions: how does SCR regulate, what other genes are involved and what is the exact molecular mechanism of the shoot gravitropic pathway. Hypocotyl of these suppressors exhibit improved gravitropic response over scr mutant. Starch

staining of the hypocotyl with I-KI solution shows almost an absence of amyloplast granules in the suppressors grown in sucrose free medium. However, suppressors grown on 1% sucrose medium show the presence of some amyloplasts. Cross sections of the hypocotyl reveal that suppressors still have defective radial pattern. These results indicate that neither the presence of endodermis nor the amyloplast sedimentation is essential for hypocotyl gravitropism. In order to explore the mechanism, we have generated WT and *scr1* lines that carry *35S::SCR* construct and express *SCR* in ectopic location. *35S::SCR/scr1* plant hypocotyl showed gravitropic response similar to WT plants while *35S::SCR/WT* plant hypocotyls had very weak gravitropic response similar to *scr* mutant. The staining results of *35S::SCR/WT* and *35S::SCR/scr1* reveal that amyloplast sedimentation in *35S::SCR/WT* is similar to WT while *35S::SCR/scr1* resembles *scr1*. These results further support our hypothesis that there is an alternative pathway for shoot gravitropism.

INVESTIGATION OF THE MICROBIAL DIVERSITY IN CALCIFIED MATS FROM A PERENNIALY ICE COVERED LAKE JOYCE IN MCMURDO DRY VALLEY, ANTARCTICA. JONATHAN P. HUANG, NAZIA MOJIB, AND ASIM K. BEJ, DEPT. OF BIOLOGY, UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, AL 35294. DALE ANDERSEN, CARL SAGAN CENTER FOR THE STUDY OF LIFE IN THE UNIVERSE (SETI INSTITUTE), MOUNTAIN VIEW, CALIFORNIA, 94043

The calcified 7 meter microbial mats residing in Lake Joyce in the McMurdo Dry Valleys in Antarctica offer a unique opportunity to investigate the formation of structures that are analogous to ancient stromatolites. The diversity of the eubacterial communities in these mats was determined using culture-independent community DNA. The 16S rRNA gene sequences from the community DNA clone library were found to be unique and unable to pair with known bacterial genera. This suggests that Lake Joyce microbial mats harbor a complex microbial community which may potentially yield new eubacterial genera. In addition, an uncommon group of bacterial genera including *Rhodopseudomonas*, *Bdellovibrio*, *Opitutus*, *Spartobacteria*, *Leptothrix*, and *Nitrospira* were identified. Other common genera of known Antarctic bacteria were also found in these microbial mats including *Flavobacterium*, *Clostridium*, and *Rhodoferrax*. Our results showed that culture-independent methodology is essential in obtaining the best coverage of the microbial diversity in Lake Joyce mat samples. The study of the taxonomic identification and the extent of biodiversity of the microbial consortium are essential to unfold their role in the formation of the calcified microbialites in Lake Joyce and other lakes in the McMurdo Dry Valleys.

IS THERE A DIETARY REQUIREMENT FOR ASCORBIC ACID IN LYTECHINUS VARIEGATUS? WARREN T. JONES, STEPHEN A. WATTS, THE UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, AL, 35294, ANTHONY SICCARDI III AND ADDISON L. LAWRENCE, TEXAS AGRILIFE MARICULTURE RESEARCH PROJECT, PORT ARANSAS, TX 78373.

Nutritional supplementation in formulated diets is an integral part of the aquaculture industry. We are currently researching the dietary requirements of the variegated sea urchin, *L. variegatus*. Ascorbic acid is an essential micronutrient in the diet of most animals. Juvenile

sea urchins (ca. 0.08 g) were raised in the laboratory and fed one of eight semipurified diets with the following amounts of ascorbic acid for 10 weeks: 8, 26, 45, 72, 100, 313, 465, and 921 mg ascorbic acid/kg feed. Under the conditions of this study, there were no significant differences in wet weight gain (ANOVA, $p > 0.05$) among diet treatments under the conditions of this study. Additionally, there were no significant differences in test, lantern, gut, or gonad dry weights among treatments (ANCOVA, $p > 0.05$). Linear regression indicated that ascorbic acid level was not a significant factor in the model; however, age of the sea urchin was a significant factor. This study suggests that dietary ascorbic acid may not be required nutritionally in juvenile *L. variegatus*, and we hypothesize it may be produced endogenously. Additionally, genetic factors may be influential in sea urchin weight gain. Further studies are needed, as ascorbic acid may have important physiological roles in sea urchins that do not directly affect weight gain. These studies were supported in part by the Mississippi-Alabama Sea Grant Consortium.

PLANT SPECIATION IN THE REALM OF ALLOPOLYPLOIDS: THE CURIOUS CASE OF THE TEMPERATE BAMBOOS. JIMMY K. TRIPLETT, DEPT. OF BIOLOGY, JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265, JUN WEN, NATIONAL MUSEUM OF NATURAL HISTORY, SMITHSONIAN INSTITUTION, WASHINGTON, DC 20013-7012, AND LYNN G. CLARK, DEPT. OF ECOLOGY, EVOLUTION, AND ORGANISMAL BIOLOGY, IOWA STATE UNIVERSITY, AMES, IA 50011.

Genome doubling (polyploidy) is considered to be common in plants, yet biologists have few model systems in which to study the broad-scale evolutionary consequences of this phenomenon. Based on recent evidence, the temperate bamboos provide a large-scale example of polyploid speciation in the context of plants that are ecologically and economically important. The temperate bamboos encompass 500+ species in Asia, Africa, and North America (including three in Alabama) and are among the most problematic plants from a taxonomic perspective. Recent data implicated hybridization as a cause of taxonomic confusion while highlighting the possible role of polyploidy. In the current investigation, low-copy nuclear genes (including an endo-1,4- β glucanase and a poly-A binding protein) were used to reconstruct phylogenetic relationships. These data suggest that all 500+ species are descended from a single allotetraploid ancestor that was derived from two divergent parents. Subsequent diversification has produced species that are genetically, morphologically, and ecologically distinct, yet retain both parental genomes. Moreover, new species have been produced by ongoing hybridization at the tetraploid level. This new evidence, combined with previous studies using chloroplast DNA and AFLP data, suggests that hybridization and polyploidy have had important and recurrent roles in the evolution of these forest grasses.

PLANT SURVIVAL AND SOIL WATER AVAILABILITY IN GREEN ROOF MICROCOSMS. JULIE G. PRICE AND STEPHEN A. WATTS, DEPT. OF BIOLOGY. JASON T. KIRBY AND ROBERT W. PETERS, DEPT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING, UAB,

BIRMINGHAM, AL 35294. AMY N. WRIGHT, DEPT. OF HORTICULTURE, AUBURN UNIV., AUBURN, AL 36849.

Green roofs represent a harsh habitat in which plants must withstand temperature and moisture extremes. Succulents generally have low transpiration rates to survive drought and species like Sedums are commonly planted in green roofs. However, with irrigation, other non-succulent species have been successful in rooftop trials at UAB. Utilizing species that have higher transpiration rates may increase the benefits of stormwater mitigation and reduced heat flux, since these benefits are derived from insulation and evapotranspiration from the substrate and vegetation. Plug-sized plants of *Antennaria plantaginifolia*, *Bouteloua curtipendula*, *Phlox bifida*, *Sedum album* 'France', and *Sedum rupestre* 'Angelina' were planted in pots with green roof soil. Plants and soil-only controls were subjected to different degrees of water limitation over 90 days: water to field capacity every 5, 10, or 20 days. Soil moisture and the weight of each (pot, soil, and plant combined) were measured prior to and just after rewatering. Initial shoot and root dry weight of additional representative plants was compared with final shoot and root dry weights of experimental plants. Only *Sedum* sp. survived the 20-day watering treatment, and all other species were most successful in the 5-day watering treatment. Further studies are needed to determine if large-scale application of non-succulents leads to differences in soil temperature and stormwater mitigation.

PRELIMINARY EFFECTS OF COUMADIN AND CAFFEINE MIXTURES ON XENOPUS LAEVIS EMBRYOS: SHOULD THEY BE USED TOGETHER? SUNDE JONES, KRISTIN SHIREY, GEORGE CLINE, MARK MEADE, AND JAMES RAYBURN. DEPARTMENT OF BIOLOGY, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265.

Coumadin (warfarin) is an anticoagulant medication used by humans to prevent strokes and heart attacks. Caffeine is a methylxanthine alkaloid. Caffeine affects the central nervous system by increasing alertness and decreasing fatigue. Caffeine is located in Coca-Cola and Pepsi products and hot drinks like coffee and tea. The objective of this research is to identify the interactions (synergism, antagonism or response addition) that occur with these pharmaceuticals on the developmental toxicity with frog embryos. *Xenopus laevis* embryos are a model organism for testing developmental toxicity in both human and environmental health. A Standardized Frog Embryo Teratogenesis Assay (FETAX) was used to determine the 96 hr LC50, EC50 (malformation) and Teratogenic Index (TI) of the two chemicals. Each test concentration had 2 or 4 replicates per concentration with 20 added embryos at small cell blastula stage to each dish. DMSO was used as a solvent for the Coumadin. Each day dead were recorded and solutions were changed. Our data indicated a higher LC50 than the published work (Deyoung et al 1991). The results indicated a higher malformation and death rate in the dishes containing both Coumadin (40mg/L) and Caffeine (200 mg/L) that is consistent with response addition. Caffeine had the highest malformations compared to Coumadin. There was also a significant decrease in length to the tadpoles located in the dishes containing both Coumadin and Caffeine.

ROAD - KILL SURVEY OF ALABAMA RED - BELLIED TURTLES ON THE MOBILE BAY CAUSEWAY - X. DAVID H. NELSON, DEPARTMENT OF BIOLOGY, UNIVERSITY OF SOUTH ALABAMA, MOBILE, AL 36688 AND CYNTHIA SCARDAMALIA-NELSON, PROVIDENCE HOSPITAL, MOBILE, AL 36608.

A systematic, road-kill survey was conducted on the Mobile Bay Causeway (US 90 / 98) from April 2001 to December 2010 to assess the numbers of Alabama red-bellied turtles (*Pseudemys alabamensis*) that were killed by automobile traffic. A total of 628 mortalities of the endangered, Alabama red-bellied turtle was recorded over the ten-year study: 471 hatchlings, 138 adult females (most gravid), 14 juveniles, and 5 males. A majority of the hatchlings (96%) over-wintered in their nests to emerge during the following springs (March-April). Mortality of adult females was greatest during nesting seasons: May, June, and July. Each year, from 5 to 28 nesting females (mean = 13.8, most gravid) were killed by vehicular traffic on the road. In 2008, sections of chain-link fencing (totaling 4.1 km [2.6 miles]) were financed and installed by the Alabama Department of Transportation to reduce roadway mortality of *P. alabamensis* along the eastern causeway. Since the construction of the fencing, turtle mortalities have declined significantly: from a total of 113 in 2007, to 28 in 2008, 20 in 2009, and 21 in 2010-- yearly mortality reductions of 75%, 82%, and 81%. The monitoring of the fences and turtle mortalities is continuing. Research funding was provided by the Alabama Department of Conservation and Natural Resources: Division of Wildlife and Freshwater Fisheries and the U. S. Fish and Wildlife Service.

THE EFFECTS OF APOLIPOPROTEIN MIMETIC PEPTIDES ON INFLAMMATION AND OXIDATIVE STRESS. TORAL PATEL. UNIVERSITY OF ALABAMA AT BIRMINGHAM. TORAL PATEL MENTOR: DAVID GARBER

Coronary Artery Disease (CAD) is the leading cause of deaths worldwide, especially in the United States. Despite advances in treatments for atherosclerosis, many questions pertaining to mechanisms of treatments for inflammation and oxidative stress remain unanswered. We hypothesize that peptides 4F and Ac-hE18A-NH₂ act as anti-inflammatory factors and reduce oxidative stress. We also hypothesize that peptides require apoA-I to increase paraoxonase-1 (PON-1) activity. The effects of administering peptide 4F and Ac-hE18A-NH₂ on oxidative stress were evaluated by analysis of plasma in apoA-I null mice, or C57Bl/6J and C3H mice fed either normal chow or the atherogenic Paigen diet. Oxidative stress was measured through levels of free 15-F₂t-isoprostanes, oxidized lipids, and PON-1 and PAF-AH enzymatic activity. Inflammation was detected through IL-6 and SAA levels. Macrophage modulation was examined through immunohistochemistry. Peptides 4F and Ac-hE18A-NH₂ did not significantly change or reduce isoprostane levels, lipid hydroperoxides, PON-1 and PAF-AH activity, or IL-6 levels. C57Bl/6J mice fed the Paigen diet and treated with 4F had reduced levels of serum amyloid A (SAA) and decreased aortic sinus macrophage load. Cholesterol increased in apoA-I null mice with Ac-hE18A-NH₂ treatment after two weeks, suggesting that Ac-hE18A-NH₂ increases apolipoprotein synthesis in these mice. Our results suggest that peptide 4F requires apoA-I to function and affect PON-1. The information obtained from this study will provide insight into potential mechanisms by which peptide 4F

and Ac-hE18A-NH₂ affect inflammation and oxidative stress, as well as the role of apoA-I in peptide function.

THE INVASION OF IGOR: DISCOVERY OF MYCOBACTERIOPHAGE. AMBER PEEK, DR. LAJOYCE DEBRO, AND DR. CHRIS MURDOCK, DEPT. OF BIOLOGY, JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265.

This research is part of Howard Hughes Medical Institute's plan to allow college freshman a chance to become knowledgeable in the research area by performing innovative procedures towards the discoveries of mycobacteriophage using the bacteria host *Mycobacterium smegmatis* which is a cousin to tuberculosis. Hopefully by finding something that infects *Mycobacterium smegmatis* it can be tested on tuberculosis and possibly cure it. I found my mycobacteriophage, Igor, and I made it my objective to learn everything I could about it. Igor, was captured, tamed and dissected to its DNA form which was only cut by one restriction enzyme during the digestion step. Igor's Transmission Electron Microscope picture showed interesting data that will want to be used for further research in the future. Acknowledgments HHMI, SEA, and NGRI JSU Biology Department AAS BY 114 Dr. Murdock Dr. Debro

USE OF ALLOZYME MARKERS TO DETECT GENETIC VARIATION IN WALLEYE POPULATIONS. AALA A. ABULFARAJ, SIRISHA BETHALA, JANET GASTON, AND NEIL BILLINGTON, DEPT. OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES, TROY UNIV., TROY, AL 36082.

Walleye (*Sander vitreus*) is a large predaceous North American percoid fish, which are common in the mid-western U.S. and Great Plains regions. Allozyme markers were used to survey genetic variation for 1270 walleyes in 13 populations. Populations were collected from the mid-west (Iowa, Minnesota, and South Dakota,) and the Great Plains (Montana, Wyoming, and Saskatchewan and Manitoba, Canada) by gillnets and electrofishing. Liver and muscle samples were screened by cellulose acetate gel electrophoresis. Three loci were found to be polymorphic in walleye, esterase (*EST**), malate dehydrogenase (*sMDH-3**), and general muscle protein (*PROT-3**). Three alleles were found at *EST**: *100, *105, and *115, three alleles at *sMDH-3**: *70, *100, and *120, and two alleles at *PROT-3**: *100 and *160. Observed genotypic frequencies deviated significantly from Hardy-Weinberg expectations in eight populations for *EST**, five populations for *sMDH-3**, and three populations for *PROT-3** all due to heterozygote deficiencies. These deviations likely resulted from the Wahlund effect, because samples were mostly collected during the summer and fall rather than during the spring spawning season. Results showed that there was highly significant among population heterogeneity for walleye from the mid-western U.S. and the Great Plains over all three loci ($\chi^2=516.37$, $df=50$, $p<0.001$). Knowledge of genetic variation among walleye populations will help fisheries management agencies to improve their management of the species; populations should not be mixed because they are genetically heterogeneous.

ZEBRAFISH ARE AN IMPROVED MODEL FOR OBESITY RESEARCH. STEPHEN A. WATTS AND MICKIE L. POWELL, DEPT. OF BIOLOGY, UAB, BIRMINGHAM, AL 35294. LOUIS R. D'ABRAMO, WILDLIFE, FISHERIES AND AQUACULTURE, MISS. STATE UNIV. MISSISSIPPI STATE, MS 39762.

SPECIAL INSTRUCTIONS: The genus species names *Danio rerio* and *Artemia* should be italicized.

The zebrafish *Danio rerio* is now defined as an excellent animal model for environmental and biomedical research. Several recent reviews have reported that zebrafish have physiological and molecular responses to dietary-induced obesity (DIO) that are similar to those found in most mammals, including humans. Accordingly, responses to nutrients, nutraceuticals, and pharmacologics can be evaluated using the zebrafish model. Unfortunately, confident comparative analysis of results is not possible because of the lack of a standard reference diet. We have successfully developed the first open formulation diet that can serve as a reference diet for future investigations using zebrafish as a model. The diet is composed of chemically-defined ingredients and has a proximate composition of 53 % crude protein (containing animal and plant sources), 24% crude lipid (containing n-3 and n-6 sources), 6% ash, 3% fiber, and 14% carbohydrate (by difference). Growth rates and survival of fish fed this diet are equivalent or exceed those achieved using commercially available but undefined diets. Anecdotal observations indicate that adult zebrafish achieve high reproductive success when the potential reference diet is fed exclusively with no supplement of traditionally-used live feed (*Artemia nauplii*). The composition of the reference diet can be modified to evaluate the effects of quantity and quality of different nutrients on genomic, transcriptomic, and metabolomic responses as they relate to fat deposition in zebrafish. In addition, the influence of prophylactic nutrients and pharmacologics on fat deposition can be precisely evaluated.

ZOOGEOGRAPHY OF THE INVASIVE SNAIL, MELANOIDES TUBERCULATA (MULLER, 1774) AND ITS CONCOMITANT TREMATODE PATHOGEN, CENTROCESTUS FORMOSANUS (NISHIGORI, 1924). LORI TOLLEY-JORDAN, DEPT. OF BIOLOGY, JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265. MICHAEL CHADWICK, DEPT. OF GEOGRAPHY, KINGS COLLEGE LONDON, LONDON, UK.

Melanoides tuberculata (Gastropoda: Thiaridae), a parthenogenetic, operculate snail of Asian origin, is the most common first intermediate host of *Centrocestus formosanus* (Digenea: Heterophyidae), a pathogen of Asian origin that causes decreased fitness or mortality in second intermediate fish hosts. We documented range expansions (outside of Southeast Asia) of *M. tuberculata*, and *C. formosanus* infections in snails and host fishes using published records. Results showed *M. tuberculata* occurs in tropical waters on all continents, the Caribbean, Indo-Pacific and Oceanic islands. Further, in temperate latitudes, the snail invaded warm-water springs with water temperatures greater than 17 degrees C. The parasite was also globally distributed by *M. tuberculata* and fishes (128 species); albeit no infected snails or fishes were reported from the Caribbean, South America, or Africa. We suspect further invasions into novel systems via releases of infected snails and fishes. In addition, declines in populations of rare fishes, particularly in warm-water springs, are of major

concern. Monitoring the invasion of snails and parasites into novel freshwaters is necessary to document, and possibly prevent, further range expansions of these invasive species.

Biological Sciences Poster Abstracts

A SURVEY OF CHYTRID FUNGUS, BATRACHOCHYTRIUM DENDROBATIDIS, INFECTION OF AMPHIBIANS IN THE MONTEVALLO AREA OF ALABAMA. PATRICK D. MORRIS AND DR. JILL A. WICKNICK, DEPT. OF BIOLOGY, CHEMISTRY, AND MATHEMATICS, UNIV. OF MONTEVALLO, MONTEVALLO, AL 35115. MELANIE L. STYERS, DEPT. OF BIOLOGY, BIRMINGHAM-SOUTHERN-COLLEGE, BIRMINGHAM, AL 35294.

Global amphibian declines and extinctions are linked to the infectious fungal disease, chytridiomycosis, which is caused by a chytrid fungus (*Batrachochytrium dendrobatidis* [Bd]). Rescues of imperiled species have been inhibited due to uneven global survey efforts, which prohibit charting a complete map of the pathogen's distribution. We initiated a local surveying program in the Montevallo area by examining amphibians for the presence of Bd. A total of 74 amphibians were swabbed for skin brushings, and tested for the presence of Bd using PCR (Polymerase Chain Reaction) analysis. Six bullfrog (*Lithobates catesbeianus*) tadpoles tested positive for *Bd* spores and originated from a single pond. Species that tested negative included *Lithobates sphenoccephalus utricularius*, *Anaxyrus terrestris*, *Anaxyrus americanus*, *Hyla cinerea*, and *Hyla versicolor/chrysoscelis*. *Lithobates catesbeianus* show mild symptoms or no symptoms when carrying Bd. Because the disease is not lethal to *L. catesbeianus*, it is a potential disseminator of chytridiomycosis in the Montevallo area. Funding for this research was provided by the McNair Scholars Program and a UM faculty research grant to MLS. KEYWORDS: Alabama, amphibian decline, *Batrachochytrium dendrobatidis*, chytridiomycosis, *Lithobates catesbeianus*, PCR, survey

ANTIBIOTIC RESISTANCE AMONG ESCHERICHIA COLI FROM HUMAN, BOVINE, AND EQUINE SAMPLES. JENNIFER KENNARD, BRIAN BURNES, DEPT. OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES, UNIV. OF WEST ALA., LIVINGSTON, AL 35470.

Escherichia coli was collected from three different hosts from the Fish River Basin and tested for growth in response to thirteen different antibiotics. Antibiotic resistance was measured using the Kirby-Bauer Disc Diffusion Assay. Zones of inhibition were recorded and analyzed for correlation among the different animals. The *E. coli* from the human samples were found to be more resistant to ampicillin, amoxicillin, chloramphenicol, ciprofloxacin, erythromycin, gentamicin, nalidixic acid, and sulfisoxazole. *E. coli* obtained from equines were found to be more resistant to neomycin and streptomycin whereas *E. coli* obtained from bovines were found to be more resistance to spectinomycin, oxtetracycline, and tetracycline. In conclusion, there are clear differences in the antibiotic resistances among *E. coli* from the three hosts.

ANTIBIOTIC RESISTANCE PATTERNS OF *ESCHERICHIA COLI* FROM THE GASTROINTESTINAL TRACTS OF HUMANS, CATTLE, AND DEER. BRIAN S. BURNES, DEPT. OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES, UNIV. OF WEST ALA., LIVINGSTON, AL 35470.

One thousand one hundred and forty four strains of *E.coli* were isolated from a municipal wastewater treatment plant, cattle, or deer in the Dry Creek watershed in central Alabama and tested for resistance to ampicillin, chloramphenicol, erythromycin, neomycin, oxytetracycline, spectinomycin dihydrochloride, streptomycin sulfate, and tetracycline hydrochloride. Eighty three unique resistance patterns were observed; 78 from humans, 8 from cattle, and 6 from deer. Resistance to no antibiotics was found in 39% of cattle *E.coli* and 48% of deer *E.coli*, but only 1% of human *E.coli*. Over 50% of the remaining cattle *E.coli* and over 46% of the remaining deer *E.coli* were resistance to one or two antibiotics, compared to 18% of the human *E.coli*. Resistance to three or more antibiotics was found in 7% of cattle *E.coli*, 0% of deer *E.coli*, and 81% of human *E.coli*. No *E.coli* from cattle or deer were resistant to ampicillin, chloramphenicol, neomycin, or oxytetracycline, however 82% of human *E.coli* were resistant to ampicillin, 58% to chloramphenicol, 38% to neomycin, and 43% to oxytetracycline. The results of this study suggest that cattle and deer have antibiotic resistance patterns which are clearly differentiable from humans, and that cattle and deer present lower risks of harboring or spreading antibiotic resistant *E. coli* than humans.

CHANGES IN INTRACELLULAR CALCIUM CONCENTRATION IN CRUSTACEAN (*CALLINECTES SAPIDUS*) Y-ORGANS: RELATION TO THE HEMOLYMPHATIC ECDYSTEROID TITER. HSIANG-YIN CHEN, DEPT. OF BIOLOGY, UNIV. OF ALA. AT BIRMINGHAM, AL 35294. RICHARD M. DILLAMAN AND ROBERT D. ROER, DEPT. OF BIOLOGY AND MARINE BIOLOGY, UNIV. OF NORTH CAROLINA AT WILMINGTON, NC 28403. R. DOUGLAS WATSON, DEPT. OF BIOLOGY, UNIV. OF ALA. AT BIRMINGHAM, AL 35294.

Secretion of ecdysteroid molting hormones by crustacean Y-organs is negatively regulated (inhibited) by molt-inhibiting hormone (MIH), a neuropeptide produced by neurosecretory cells in the eyestalks. The effect of MIH on Y-organs is mediated by one or more cyclic nucleotide second messengers. In addition, extant data indicate that ecdysteroidogenesis is positively regulated (stimulated) by intracellular Ca^{++} . Our previous results showed that ablating the eyestalks from blue crabs (*Callinectes sapidus*), to remove the endogenous source of MIH and activate Y-organs, led to an increase in Ca^{++} in Y-organ cells; associated with the increase in intracellular Ca^{++} was a significant increase in the hemolymphatic ecdysteroid titer. In experiments reported here, we measured Ca^{++} levels in Y-organ cells (using a fluorescent calcium indicator, Fluo-4) and ecdysteroid levels in hemolymph (using radioimmunoassay) during selected stages of a natural molting cycle. Calcium fluorescence in Y-organ cells increased >6-fold between intermolt (stage C) and late premolt (stage D3) ($P < 0.05$), then dropped during postmolt (stage A) to a level indistinguishable from that seen in intermolt ($P > 0.05$). Changes in the hemolymphatic ecdysteroid titer followed a similar pattern, rising from 1.4 ng/ml in intermolt (stage C) to 357.1 ng/ml in late premolt (stage D3),

and then dropping to 30.3 ng/ml in postmolt (stage A). The above results are consistent with the hypothesis that ecdysteroidogenesis is stimulated by an increase in intracellular Ca^{++} . Additional findings from our lab indicate intracellular Ca^{++} may be linked to enhanced ecdysteroidogenesis through activation of cyclic nucleotide phosphodiesterase.

DIAMONDBACK TERRAPINS: EVALUATING THE HOME RANGE OF ADULT FEMALES IN CEDAR POINT MARSH, ALABAMA. TAYLOR ROBERGE, ANDREW COLEMAN, THANE WIBBELS AND KEN MARION, DEPT. OF BIOLOGY, UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, AL 35205. DAVID NELSON, DEPT. OF BIOLOGY, UNIVERSITY OF SOUTH ALABAMA, MOBILE, AL 36688. JOHN DINDO, DISL, DAUPHIN ISLAND, AL 36528.

The diamondback terrapin, *Malaclemys terrapin*, was once a very abundant species in the salt marshes of Alabama. A variety of threats have impacted this species and resulted in drastic declines over the past century. The diamondback terrapin is currently considered a species of highest conservation concern in Alabama. Surveys over the past five years indicate that the diamondback terrapin is currently represented by small nesting aggregations in specific salt marshes on the Alabama coast. The current study evaluated the movements of adult female terrapins from the largest known nesting aggregation in Alabama. Radio transmitters were fitted to eight adult females during the 2010 nesting season. These transmitters had a range of approximately 1.0 km and a battery life of approximately 1 year. The results indicate that some of the females have relatively small home ranges (e.g. a km or less), and remain resident in the salt marsh directly adjacent to the nesting beach. The results have implications for both the ecology and conservation of diamondback terrapin in Alabama. This work is being funded through a state wildlife grant and a coastal area management program. Supplemental funding was provided by the U.A.B. Department of Biology and the Alabama Academy of Science.

EFFECT OF MEGADOSE LEVELS OF DIETARY VITAMIN D IN THE SEA URCHIN *LYTECHINUS VARIEGATUS*. WARREN T. JONES, STEPHEN A. WATTS, THE UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, AL, 35294, ANTHONY SICCARDI III, AND ADDISON L. LAWRENCE, TEXAS AGRILIFE MARICULTURE RESEARCH PROJECT, PORT ARANSAS, TX 78373.

Small *Lytechinus variegatus* (ca. 18g wet weight) were collected from Saint Joseph Bay, Florida and transported to the Texas Agrilife Mariculture Research Laboratory. Urchins were acclimated to laboratory conditions (32 ppt salinity, 22 C, 12:12 photoperiod) and placed into individual open-ended plastic mesh cages (n = 16 per diet treatment). Prior to the study, 16 urchins were dissected to obtain initial weights of organs. Groups of 16 urchins each were fed one of eight semi-purified diets supplemented with various levels of vitamin D₃ ranging from 6360 IU vitamin D/kg diet to 8,160,000 IU vitamin D/kg diet. Significant weight gain and 100% survival was observed in all treatments. At 15 weeks, sea urchins fed vitamin D diets did not display observable pathologies and did not demonstrate dietary toxicity despite the megadose levels of dietary vitamin D. Sea urchins fed 6460, 2,060,000, and 8,160,000 IU vitamin D/kg diet had significantly higher dry lantern weights than those fed 73,100 IU vitamin D/kg diet (ANCOVA, $p < 0.05$). Additionally, sea urchins fed 73,100 and 2,060,000

IU vitamin D/kg diet had higher dry gonad weights than those fed 6360 and 8,160,000 IU vitamin D/kg diet (ANCOVA, $p < 0.05$). Under the conditions of this study, vitamin D did not affect survival nor create observable pathology. Supported in part by the Mississippi-Alabama Sea Grant Consortium.

EFFECTS OF APOLIPOPROTEIN MIMETIC PEPTIDES ON INFLAMMATION AND OXIDATIVE STRESS. TORAL PATEL, TAMARA KEENUM, GAURAV NAYYAR, VINOD MISHRA, MAYAKONDA PALGUNACHARI, DAVID GARBER. UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Coronary Artery Disease is the leading cause of deaths worldwide, especially in the United States. Despite advances in treatments for atherosclerosis, many questions pertaining to mechanisms of treatments for inflammation and oxidative stress remain unanswered. We hypothesize that peptide 4F acts as an anti-inflammatory factor and reduces oxidative stress. The effects of administering peptide 4F on oxidative stress were evaluated by analysis of plasma in C57Bl/6J and C3H mice fed either normal chow or the atherogenic Paigen diet. Oxidative stress was measured through levels of free 15-F_{2t}-isoprostanes and oxidized lipids, and paraoxonase-1 (PON-1) and PAF-AH enzymatic activity. Inflammation was detected in plasma of animals by measuring IL-6 and serum amyloid A (SAA) levels. Macrophage modulation was examined through immunohistochemistry for aortic sinus macrophage load. Peptide 4F did not significantly reduce isoprostane levels. Treatment with peptide did not change or decrease lipid hydroperoxides, PON-1 and PAF-AH activity, or IL-6 levels. C57Bl/6J mice, but not C3H mice, fed the Paigen diet had increased levels of SAA, and administration of 4F reduced SAA levels to those of mice on standard chow. Macrophage load significantly decreased in mice fed the atherogenic diet. Our results suggest that C3H mice are less susceptible to inflammation on the Paigen diet than C57Bl/6J, as seen through concentrations of inflammatory markers. The information obtained from this study will provide insight into potential mechanisms by which peptide 4F affects inflammation and oxidative stress.

EXPRESSION ANALYSIS OF A POTENTIAL MALE SEX DETERMINING FACTOR IN A TURTLE WITH TEMPERATURE-DEPENDENT SEX DETERMINATION. KAYLA BIESER AND THANE WIBBELS, DEPT. OF BIOLOGY, UNIV. OF ALA. AT BIRMINGHAM, BIRMINGHAM, AL 35294

Many reptiles possess temperature-dependent sex determination (TSD), in which the incubation temperature of the egg determines the sex of the hatchling. A number of mammalian and avian sex determining genes are present in reptiles, but none have been verified to be the sex determining switch. DMRT1 is a transcription factor that regulates target genes triggering testis formation. In birds, the Z-linked gene DMRT1 has been implicated as the male sex determining gene. Knockdown expression of DMRT1 resulted in genetic males becoming sex reversed. In the red-eared slider turtle, *Trachemys scripta*, DMRT1 shows sexually dimorphic expression prior to and during the temperature sensitive period. DMRT1 expression is up-regulated at male-producing temperatures, but remains low throughout female-producing temperatures. To further study the role of DMRT1 in TSD reptiles, *T. scripta* embryos were incubated at male and female producing temperatures.

Additionally, embryos were sex reversed from female-to-male with an aromatase inhibitor (Letrozole) and from male-to-female with 17 β -estradiol. Adrenal-kidney-gonad complexes were dissected from the embryos at developmental stages 15, 17, 19, 21, and 23 and qPCR was performed. The results are consistent with an increase in DMRT1 expression at male producing temperatures and during female-to-male sex reversal. These results provide an insight into the potential role of DMRT1 as a male sex determining factor during TSD in *T. scripta*. Funding provided by Sigma-Xi Grants-in-Aid of Research.

FISHES OF THE UPPER CHOCCOLOCCO CREEK SUB-WATERSHED IN ALABAMA GREGORY SCULL [2], MEGAN CORDLE [1], AND MARK MEADE [1] [1] DEPARTMENT OF BIOLOGY, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, ALABAMA 36265 [2] UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, GADSDEN, ALABAMA 35901

Surveys were conducted to document the distribution of fishes within the headwaters of Choccolocco Creek, a tributary of the Middle Coosa River System. The Coosa River System is considered to be the most diverse system in the Mobile Basin in terms of fishes and is described as containing 147 freshwater species (Mettee, O'Neil and Pierson, 1996). Collections made at 27 stations during the timeframe of 2008 through 2010 resulted in the captures of 4,316 individuals and an inventoried fish fauna comprised of 10 families, and 39 species. The results of these surveys show that the upper Choccolocco Creek Sub-watershed is diverse in terms of its fish fauna containing 27% of the 147 species described from the Coosa River System.

HCN CHANNELS AND 4-AP INDUCED EPILEPTIFORM ACTIVITY. STEVEN PALLADINO, DEPARTMENT OF BIOLOGY, UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, ALABAMA, 35294. JOHN HABLITZ, DEPARTMENT OF NEUROBIOLOGY, UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, ALABAMA, 35294.

Epilepsy is a disease characterized by dysfunction in the inhibitory and/or excitatory signaling mechanism of neurons. The 4-aminopyridine (4-AP) model of epilepsy allows for the induction of epileptiform activity while preserving excitatory and inhibitory synaptic activity. In this study, we used voltage- and current clamp recording to study the role of hyperpolarization-activated non-specific cation channels HCN in the 4-AP model. Patch clamp recordings were obtained from layer 5 cortical pyramidal cells in rat brain slices. Control recordings obtained in the presence of 4-AP and the HCN channel blocker ZD7288 (20 μ M) was bath applied. Current clamp recordings showed an increase in the duration of evoked epileptiform events after bath application of ZD7288. In voltage clamp recordings, similar increases in duration were observed. This suggests that changes were to enhanced input to the recorded cell and not alterations in resting potential and input resistance. Blockade of HCN channel enhances epileptiform activity by increasing network excitability.

IDENTIFYING SOURCES OF PATHOGEN CONTAMINATION IN THE UPPER FISH RIVER, ALABAMA. BRIAN S. BURNES, PH.D. DEPT. OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES, UNIV. OF W. ALA., LIVINGSTON, AL 35470.

Fish River, in the Weeks Bay watershed, Baldwin County, Alabama is on the Clean Water Act §303(d) list for pathogen contamination. Typical efforts to reduce potential sources of pathogen contamination, such as fencing-out cattle, providing an alternative watering source, and providing a hard-bottom crossing, have failed to reduce pathogen counts in the Fish River. Additionally, development in the upper Fish River watershed has added numerous potential sources such as septic systems, sewer lines, wastewater treatment plants, and urban stormwater runoff. To address this problem, *E. coli* from several sites in the upper Fish River were tested for antibiotic resistance and the results were analysed using linear discriminant function analysis. Antibiotic resistance patterns exhibited by the Fish River *E. coli* were compared to the antibiotic resistance of *E. coli* in a reference database generated from humans, cattle, and horses to establish the most likely source(s) of pathogen pollution. Although significant *E. coli* contributions were identified from humans, the predominant antibiotic resistance patterns appear to be from horses.

ISOLATION OF KURTHIA GIBSONII FROM BOTTOM OF SHOE. ZACHARY L. RILEY AND BRIAN BURNES, PH. D. UNIVERSITY OF WEST ALABAMA LIVINGSTON, AL 35470.

Tests were done to identify the type of bacteria species was on the bottom of a shoe that was exposed to canine feces. The microbe was motile, gram +, non-sporing, rod shaped, non-pigmented, aerobic, and it grew significantly at 42 degrees Celsius. Biolog plate test indicated the bacteria grew at 5 and 6 pH levels and at 5 to 6% NaCl solution. From comparison to Bergey's Manual of Determinative Bacteriology, 9th edition, it is concluded that the sample is *Kurthia gibsonii*. *Kurthia* can be found in cured meat that has been stored at elevated temperatures in addition to being in stomachs of mammals. But most often species of *Kurthia* can be found in the feces of domestic animals such as chickens and pigs, but the bacteria has also been found in the feces of human patients having diarrhea. Leaving a colony of *Kurthia* in the direct sunlight increased the growth rate, therefore, decreasing the temperature of the environment discourages the growth of *Kurthia gibsonii*.

MEASURING MARSH PLANT PRODUCTIVITY AND MICRO-, MEIO-, AND MACROFAUNAL ABUNDANCE AND DIVERSITY IN RESPONSE TO OILING IN A NORTHERN GULF OF MEXICO SALT MARSH. LEE STANTON, BRIAN BURNES AND JOHN MCCALL, DEPT., OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES, UNIV. OF WEST ALA., LIVINGSTON, AL 35470.

Much uncertainty exists regarding the impact that oiling may have on the ecology of intertidal salt marsh systems. The Deepwater Horizon event provides a unique opportunity to assess the manner in which salt marsh communities respond to stressors of this nature. In addition, it provides an opportunity to evaluate the long-term response of the salt marsh

community at several levels. Our goal is to quantify the impacts to microbial and meiofaunal distributions, plant diversity and productivity, and macrofaunal habitat utilization by comparing oiled to non-oiled salt marshes in coastal Alabama and Louisiana. We have begun sampling microbial and meiofaunal distributions, plant diversity and productivity, and macrofauna habitat utilization in both oil-impacted and non-impacted locations at Point aux Pins (PAP) salt marsh in south Mobile County, Alabama. Information from NOAA's SCAT-Mobile Ground Observations (www.geoplatform.gov/gulfresponse) on August 3, 2010 indicate light and moderate oiling on the eastern shore of PAP, as well as comparable non-oiled areas. Similar samples will be collected quarterly from marsh locations near Port Fourchon, LA. The SCAT-LA Ground Observations indicate heavily oiled locations in Timbalier Bay marshes beginning in May of 2009, with adjacent areas free from oiling. Louisiana sites will be sampled only for microbial, meiofaunal, and plant community composition, and will provide a heavily oiled/non-oiled point of reference for comparison to Alabama sites. While Alabama and Louisiana salt marsh system are fundamentally different in structure, a comparison of oiled and non-oiled sites in the two areas may provide insight into how these two distinct communities respond to and recover from oil stress.

MOLECULAR IDENTIFICATION OF GASTROINTESTINAL BACTERIA FROM ADULT COPE'S GREY TREEFROGS (*HYLA CHRYSOSCELIS*). BENJIE BLAIR, CHRIS MURDOCK, AND CHERYL SESSLER, JACKSONVILLE STATE UNIVERSITY 36265.

Hyla chrysoscelis, or Cope's Grey Treefrogs, are common in the eastern United States and are not known to be experiencing the population declines observed in many amphibian populations. Anuran metamorphosis results in remodeling of the intestinal tract from tadpoles which have simple intestinal organization to more complex adult frogs. Adult digestive tracts are more structurally similar to those of higher organisms, including mammals. Previous studies have shown that adults feed primarily on insects, while tadpoles filter feed a variety of organisms from the water column. These bacteria are believed to be highly involved in proper nutrient assimilation and immune function. The goal of this project is to molecularly identify bacteria in the gastrointestinal tract of adult Cope's grey treefrogs. Five adult *H. chrysoscelis* were collected from a single site in Jacksonville, Alabama and euthanized according to AVMA guidelines. Gastrointestinal tracts were removed from each frog and homogenized and pooled. Genomic DNA was extracted from the pooled sample and 16S ribosomal DNA genes were amplified using universal eubacterial primers. PCR products were cloned and sequenced. Sequence analysis and phylogenetic construction was performed using MEGA 4.0 software. After phylogenetic analysis, 98% of the samples were classified into one of four phyla—Bacteroidetes, Firmicutes, Proteobacteria, and Verrucomicrobia. Sequence analysis of $\geq 97\%$ homology provided genera suggestions for several clones. Eight novel 16S rDNA sequences were published in the GenBank database.

POPULATION DYNAMICS OF SUGAR MAPLE (*ACER SACCHARUM* MARSH.) AT THE SOUTHERN PORTION OF ITS RANGE: IMPLICATIONS FOR RANGE MIGRATION AND SUCCESSION. CRAIG M. TURBERVILLE AND JUSTIN L. HART, DEPT. OF GEOGRAPHY, UNIV. OF ALA., TUSCALOOSA, AL 35487.

Evidence for climate change driven range migration exists for a variety of tree species in eastern North America. Northward range migration for tree species in the region requires a decrease in population density near the southern range boundary coupled with an increase in population density at the northern range boundary. Sugar maple (*Acer saccharum* Marsh.) is one such species that has been projected by some biogeographic models to shift north in accord with climate. However, a widespread pattern of increased sugar maple density has been reported in the forest science literature from a variety of sites throughout the species' range. This pattern is linked to a complex of interacting factors and has been hypothesized to represent a positive feedback that facilitates sugar maple regeneration. The primary goal of our study was to test which of these hypothesis (range migration or succession) was correct for the southern portion of the sugar maple range. We used Forest Inventory and Analysis program data to compare region-wide population dynamics for this species on a plot-by-plot basis. Changes in frequency, density, and dominance of sugar maple trees and seedlings were compared over multiple years for the states of Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

STRUCTURAL, BIOCHEMICAL AND BIOPHYSICAL CHARACTERIZATION OF THE INTERACTIONS BETWEEN HIV-1 MATRIX AND CALMODULIN. TIMOTHY F. FERNANDEZ, RUBA H. GHANAM, EMILY L. FLEDDERMAN, JAMIL S. SAAD, DEPT. OF MICROBIOLOGY, UNIV. OF ALA., BIRMINGHAM, AL 35294.

Although it is widely accepted that targeting of the Gag polypeptide to the plasma membrane is critical for proper assembly of human immunodeficiency virus type 1 (HIV-1), Gag's intracellular interactions and trafficking to its assembly sites in the infected cell are poorly understood. HIV-1 Gag was shown to interact and co-localize with calmodulin (CaM), a ubiquitous and highly-conserved Ca^{2+} -binding protein expressed in all eukaryotic cells and is implicated in a variety of cellular functions. Binding of HIV-1 Gag to CaM is dependent on calcium and is mediated by the N-terminally myristoylated matrix (myr(+))MA domain. We demonstrate that CaM binds to myr(+))MA with a dissociation constant (K_d) ~ 2 mM and 1:1 stoichiometry. Our data revealed that CaM binding to MA induces the extrusion of the myr group. However, in contrast to all known examples of CaM-binding myristoylated proteins our data show that the myr group is exposed to solvent and not involved in CaM binding. The interactions between CaM and myr(+))MA are endothermic and entropically driven, suggesting that hydrophobic contacts are critical for binding. As revealed by NMR data, both CaM and MA appear to engage substantial regions and/or undergo significant conformational changes upon binding. We believe that our findings will provide new insights on how Gag may interact with CaM during the HIV replication cycle.

THE EFFECTS OF INCREASING OCEAN ACIDIFICATION ON THE COVERING BEHAVIOR OF *LYTECHINUS VARIGATUS*. ROBERTA CHALLENGER, GRANT HINKLE, AND JAMES B. MCCLINTOCK, UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, AL 35233.

Covering behavior in the common nearshore sea urchin *Lytechinus variegatus* has been evaluated in previous laboratory and field studies. Several hypotheses have been postulated to

explain a covering response including protection from UV radiation and camouflage from predation. As such, understanding the potential impacts of ocean acidification on this behavior (ubiquitous among regular sea urchins) is important. The present study investigated the effects of prolonged (3.5 month) exposure to near-term end-of-century ocean acidification (pH 7.8) and ambient seawater pH (8.2) on both the rate and amount of covering in young adult *Lytechinus variegatus*. In one experiment, individuals (mean diameter = x cm) were offered 34? glass balls (x cm ball diameter) and the total number of balls held on the test counted after 20 min. In a second experiment, the same individuals were offered X ? glass balls and the number of balls held on the test counted every 4 hours over a 24 hour period (12 light: 12 dark photoperiod) in both pH treatments. There was no significant difference in the number of balls held on the test after 20 min in either pH treatment (mean balls held = X in pH 7.8, x in pH 8.2). While there was a pattern of increasing the number of balls held on the test over the first 12 daylight hours, and higher numbers then held through the night than the daylight hours, there was no significant effect of seawater pH on either the rate or the amount of cover. Our findings indicate that covering behavior in *L. variegatus* is not impacted by near-term ocean acidification.

USE OF PHYSIOLOGICAL INDICES IN MONITORING FISH STRESS.MEGAN CORDLE, AL NICHOLS, AND MARK MEADE. JACKSONVILLE STATE UNIVERSITY, DEPT. OF BIOLOGY, 700 PELHAM RD. N., JACKSONVILLE AL36265.

Diagnostic measurements often used to assess the physiological condition of humans are also useful in assessing the health and well-being of other vertebrate organisms. In fishes, diagnostic measurements are used to assess “stress” in response to environmental condition. Stress indicators may include blood glucose and cortisol concentrations, white cell counts, metabolic rates, and changes in protein expression. Mercury (Hg), a well-known pollutant in aquatic systems, bioaccumulates in food webs and likely effects many physiological systems in exposed fishes. Limited physiological data exists on the effects of mercury exposure in stream fishes, particularly acute and chronic physiological effects associated with exposure. We report here on the use of whole animal respirometry as a means of monitoring changes in metabolism in response to Hg exposure. Information on metabolism is indicative of energy partitioning and has previously been used to predict growth and fecundity potential of fishes. Metabolic rates, as determined by oxygen consumption rates, were examined in the stream minnow, *Camptostoma oligolepis*, from various Hg-free and Hg-contaminated streams. Specifically, fish examined were collected from Shoal creek, a pristine site in the Talladega National Forest, Mill Creek, an urban site in Jacksonville, AL, and Snow Creek, an urban, Hg-contaminated site in Oxford, AL. Metabolic rates were significantly higher for fishes inhabiting the Hg-contaminated site. It is hypothesized that metabolism is increased in these fishes due to gill damage and the inability to osmoregulate efficiently.

Chemistry Paper Abstracts

ALGORITHMS FOR REMOVING DRIFT IN MICROBALANCE READINGS. HALEY D. ALBRIGHT, M. B. MOELLER, DEPT. OF CHEMISTRY AND INDUSTRIAL HYGIENE, AND P. G. DAVISON, DEPT. OF BIOLOGY, UNIVERSITY OF NORTH ALABAMA, FLORENCE, AL 35632.

Measuring the water content of a recently discovered microtubellarian required moving the meiofauna in a small drop of water and observing the rate of mass loss as the water external to the worm evaporated. These mass measurements were made with a Sartorius SE2 ultramicrobalance reading to 0.1 microgram. The typical mass for these microtubellarian, without external water, was approximately 2 micrograms. The evaporation of the external water required 200 – 300 seconds and it was observed from readings with an empty pan that the balance would drift an amount comparable to the mass of the animals being measured. A study has been made to test algorithms for removing this drift from mass measurements. These algorithms interpolate between the empty pan balance readings made prior to a mass measurement and the final readings taken after a mass is removed. The algorithms tested were a straight line connecting initial and final points, a quadratic equation that matched the final slope of the drift in addition to connecting the initial and final points, and a cubic equation that matched both the initial and final slopes observed for the drift, as well as the initial and final points. Our research also revealed that opening and closing the balance door had a pronounced effect on balance readings and that this perturbation could persist for longer than 30 seconds. The data indicates that a straight line interpolation is the best of the three algorithms for removing drift.

AN INVESTIGATION INTO THE EFFECT OF COOKING ON THE ANTIOXIDANT POTENTIAL OF PEPPERS. BRIAN OGENDI, DEPT. OF PHYSICAL AND EARTH SCIENCES (CHEMISTRY), JACKSONVILLE STATE UNIV. JACKSONVILLE, AL 36265. ANDREW WOODS (COAUTHOR) AND *DR. NIXON MWEBI (MENTOR)

The Peppers high antioxidant content giving them protective abilities have caused peppers to gain increased popularity in recent years. The protective chemicals in these peppers (e.g. polyphenols) are associated with protection against several maladies including; coronary heart disease, stroke, and other forms of cancer. The peppers come in various sizes and colors, as well as in varying degree of hotness. The burning sensation in peppers is primarily due to the capsaicin molecule and renders the peppers useful in easing pain such as those associated with arthritis and muscle strain. Studies on the effect of cooking on the antioxidant potential of peppers have been inconclusive; with some indicating that heating may lower the antioxidant potential of these peppers, others pointing that heat has minimal or no effect on their antioxidant potential and yet others arguing that heating will significantly lower their antioxidant potential. These discrepancies indicate a definite lack of clarity and form the basis for our study. In this study, a systematic approach employing two UV-vis spectroscopic techniques: the ferric reducing antioxidant power (FRAP) and the free radical trap 2, 2 – diphenyl-1-picrylhydrazyl (DPPH) were used to quantify and monitor the effect of various

cooking methods (boiling, stir-frying, steaming and microwaving) on the antioxidant potential of sweet, mild and hot peppers. Our results indicate that boiling results in the highest reduction in the antioxidant potential of the peppers whereas microwaving causes the least reduction, leading us to conclude that cooking may affect the antioxidant potential of peppers, an effect that may be depended on the type and nature of the peppers and cooking method.

EXTRACTION AND IDENTIFICATION OF NON-VOLATILE ORGANIC COMPOUNDS IN GULF SEDIMENTS, H. DAVIS, M. NICHOLS, S. BRAH, AND C. HOLMES, DEPT. OF PHYS. & EARTH SCI., JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265

We have tested approx. 50 samples of Gulf sediments collected along Texas-Louisiana and Florida shoreline for volatile and non-volatile organic compound. Using head space GC-MS we have found that only 20 % of samples collected along Texas shoreline showed traces of volatile organics. Our preliminary results indicate no volatile organics in samples collected along Florida shoreline. Samples have been dried and extracted with hexane, toluene, and dichloromethane. The extracts were analyzed using HPLC and GC-MS and showed small amounts of heavy, polynuclear aromatic hydrocarbons (PAH). We are currently isolating these compounds into separate fractions for further identification.

INCLUSION IN A GEM BERYL VAR. AQUAMARINE IDENTIFIED USING VISIBLE LIGHT TRANSMISSION SPECTROSCOPY. DAVID B. THOMPSON, DEPT. OF PHYSICS AND EARTH SCIENCE, UNIV. OF NORTH ALA., FLORENCE, AL 35632.

The mineral beryl occurs in several color varieties, including a blue variety called aquamarine. Transparent aquamarine is often faceted to produce gemstones. Here, an aquamarine gemstone contains within it an interesting inclusion. The shape and orange-red color of the inclusion, as seen in a photomicrograph, suggests it is a species of garnet. The transparent nature of the inclusion permitted collection of its visible light transmission spectrum. This spectrum is diagnostic, identifying the inclusion as a garnet, and identifying the species giving rise to its color.

TGA/DSC ANALYSIS OF GULF SEDIMENTS, C. HOLMES AND M. NICHOLS, DEPT. OF PHYS. AND EARTH SCI., JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265

SPECIAL INSTRUCTIONS: Please make sure that degree of Celsius is printed with superscript "o".

Extracted and dried Gulf sediments were analyzed by TGA/DSC. We have found that several samples collected along Texas-Louisiana shoreline give small but measurable TGA/DSC signals. To eliminate contribution from biological organic material in the sediment from extractable organic compounds, we have compared TGA/DSC runs from both extracted and

non-extracted samples. TGA/DSC data have two significant endothermic peaks, at ~ 85 C° and at ~ 550 C° corresponding to desorption of residual water and heavy organic compounds. These results agree with the HPLC data.

Chemistry Poster Abstracts

CALORIMETRIC INVESTIGATION OF ICE CREAM. JEREMY BURGESS, BRANDON RUCKER, LAVEETA OLIVER, SARAH MOSES, ZACHARY HANSEN, AL NICHOLS AND NAGARAJAN VASUMATHI, DEPT. OF PHYSICAL AND EARTH SCIENCES, JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265

Caloric contents of commercial ice creams were investigated using bomb calorimetry. Samples were freeze-dried and analyzed using a LECO AC500 Automatic Calorimeter. Ben & Jerry's brand Cookie Dough ice cream had an empirically determined caloric content of 5.99 +/- 1.72 (mean +/- SD) kcal/g (Cal/g). The package label listed a caloric content of 250 Cal per serving which gave a calculated value of 5.42 kcal/g for the freeze-dried product.

DESIGNING 'DRUGGABLE' MOLECULES: TOWARD THE SYNTHESIS OF NOVEL BETA-SECRETASE INHIBITORS. CHARLES S. BUESS, RICHARD A. WAKEFIELD, AND ANDREW J. LAMPKINS, DEPT. OF CHEMISTRY & BIOCHEMISTRY, SAMFORD UNIV., BIRMINGHAM, AL 35229

Many shortcomings can preclude biologically-active polypeptides from being bona-fide 'druggable' leads including molecular size, polarizability or polarity constraints, susceptibility to hydrolysis or metabolism, and toxicity. We aim to bridge this gap in the area of Alzheimer's disease since no therapies are able to halt this (currently incurable) condition at its root—the production of neurotoxic beta-amyloid by the enzyme beta-secretase. To this end, we utilized the crystal structure of this enzyme complexed with peptidic substrates to guide our structure-based design of 'druggable' non-peptidic inhibitors. Our unique design elements are highlighted in this poster and include pharmacophore modification, prodrug utilization, thioamide isosteres, and strategic lipophilicity incorporation. These drug molecules are designed to deliver desired potency, as well as provide metabolic stability and facilitate CNS penetration. Our progress in the asymmetric synthesis of these novel beta-secretase inhibitors is also presented. The synthetic routes we utilize are convergent, flexible, amenable to library generation, of manageable length, and are composed of high-yielding, well-documented reactions.

EXTRACTION OF LACTATE DEHYDROGENASE FROM PLANT RESOURCES FOR USE IN UNDERGRADUATE BIOCHEMISTRY LABS. LAUREN R. COLLINS AND CATRINA D. MIZE, DEPT. OF PHYSICAL AND EARTH SCIENCES, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265.

Beef heart is currently used as a source of the Lactate Dehydrogenase (LDH) enzyme in Biochemistry Undergraduate labs. This source of LDH is not always readily available and the proteins are susceptible to degradation. Finding a plant based source of LDH that can be

easily extracted will cut down on protein degradation as well as being a low cost alternative to mammalian LDH.

LC-MS ANALYSIS OF THE BREAKDOWN OF ETHINYLESTRADIOL BY FUNGAL ENZYMES. LAURA BEDSOLE, DENISE J. GREGORY, LISA A. NAGY, SAMFORD UNIVERSITY, BIRMINGHAM, AL.

Large amounts of pharmaceuticals make their way into waste streams due to ingested or unused medications. These drugs often have serious effects on river ecosystems. The build up of these drugs and/or their metabolites in the food chain, may affect human health in unforeseen ways. One of the major pharmaceutical contaminants found in waste water is ethinylestradiol. Ethinylestradiol has similar functional groups to those found in lignin. Lignin is a major component of plant cell walls. It is a complex polymer consisting of cross linked phenylpropane units which contains large numbers of various types of ether linkages and free phenol groups. The enzymes within fungi are known to breakdown lignin found in logs, leaves, stems, and other organic debris. Because lignin can be broken down by fungi which have similar functional groups to ethinylestradiol, an investigation was conducted on the degradation of ethinylestradiol by white-rot fungi. Through the analysis of the LC-MS, results suggested possible breakdown of ethinylestradiol by fungi. We thank the Samford University's Department of Chemistry and Biochemistry and the Samford Undergraduate Research Program (SURP) for their support.

METAL CONCENTRATIONS IN SCAD MACKEREL, TRACHURUS LATHAMI, COLLECTED FROM THE NORTHERN GULF OF MEXICO. MERIEM ZETILI, AL NICHOLS AND DAVID STEFFY, DEPT. OF PHYSICAL AND EARTH SCIENCES, JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265

Scad mackerel, *Trachurus lathami*, were collected from the northern Gulf of Mexico on board NOAA R/V Pisces. Fish were frozen and transported to Jacksonville State University for metal analyses. Fish tissue samples were freeze-dried then hydrolyzed in trace metal grade nitric acid and hydrogen peroxide. Cold vapor atomic absorption spectrometry was used to analyze for total mercury (Hg) and ICP was used to analyze for other metals. Mercury levels in fish collected from three sites ranged from 0.02 to 0.08 micrograms of Hg per gram of tissue.

MICRO WAVE ASSISTED ISOMERIZATION REACTIONS IN ORGANIC SYNTHESIS NAGARAJAN VASUMATHI, JEREMY BURGESS*, *SARAH MOSES*, AND *ZACHARY HANSEN, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265

Maleic acid (cis-2-butene-1, 4-dioic acid), is known to undergo isomerization on treatment with a Bronsted acid or bromine in aqueous or organic medium at higher temperatures to form the thermodynamically more stable trans isomer. Our research group has previously studied these reactions in detail using different energy sources such as heat, sunlight and UV

lamp (wavelength, 365 nm). In the present study, the isomerization of maleic acid to fumaric acid is explored using microwave (MW) energy as heating source. The commercial kitchen microwave oven (860GHz/360 W) is used for the reaction. Reaction mixtures were irradiated in conical flask and/or beakers and the reaction time, product precipitation etc were noted. Reaction conditions were optimized by repeated experiments and the products were analyzed by simple melting point determination and by IR and UV spectroscopic methods. MW technique is extended further to study the optical isomerization of sec-butanol, a chiral compound as well. Racemic mixtures of chiral enantiomers exhibit change in optical properties with respect to change in temperature, solvent and concentration. The effect of temperature and solvent effect on the optical properties of isoborneol and its enantiomer has previously been studied by our group under different conditions. Our current research focuses on MW energy effect on the isomerization of one enantiomer over the other using (\pm)-sec-butanol as a model compound. The reactions are monitored by IR and the results are discussed herein.

REINVESTIGATING THE KINETICS OF SOLVOLYSIS OF T-BUTYL CHLORIDE IN ETHANOL AND ACETONE. DR. NAGARAJAN VASUMATHI, COURTNEY CROSBY AND CALVIN SCOTT, DEPARTMENT OF PHYSICAL AND EARTH SCIENCES, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265.

SPECIAL INSTRUCTIONS: The number "1" after "before" in the first sentence should be superscript. The Number "2" after "the rate constant, k" in the eighth sentence should be superscript. The numbers "1" and "2" before both references should be superscript. I'm sorry. I made a mistake in the title when I submitted it the first time. The title is changed from "Reinvestigating the kinetics of solvolysis of n-butyl chloride in ethanol and acetone" to "Reinvestigating the kinetics of solvolysis of t-butyl chloride in ethanol and acetone"

Solvolysis of t-butyl Chloride has been studied before¹. Our goal is to find out what happens to the rate of solvolysis when factors in the reaction are varied, such as: concentration, temperature, nature of the solvent or different proportions of solvent mixtures. In our current study, we are exploring the effect of two different solvent medium in different ratios at three different temperature conditions. The solvents used are mixtures of water with acetone and water with ethanol. Water serves as both the solvent and nucleophile. Theoretically, the reaction of t-butyl Chloride and water should yield t-butanol and hydrochloric acid in an SN1 reaction. Bromothymol blue and sodium hydroxide are added to indicate what is happening in the reaction via titration as the NaOH neutralizes the hydrochloric acid by-product of the reaction. In this set of experiments much information can be gathered about how various factors affect the rate constant, k². After titration, the results were graphed as time versus the decrease in the reactant concentration. The slope of these graphs tells us the individual k values for each reaction under its unique conditions. The results have interesting implications about what goes on as the ratio of solvents changes, perhaps suggesting that there is competition between an E1 reaction and SN1. This raises questions about how rates of formation of two different products vary with respect to change in solvent ratio, which will be studied by IR spectral analysis. The results of this study will be used for the future kinetic study of ester synthesis. ¹CY 231 Organic Chemistry Laboratory Manual. 2010. Kinetics of a

SN1 Reaction – Solvolysis of t-Butyl Chloride in Water-Acetone Mixture, pp. 61-73. Jacksonville State University, AL. ²Determining the Reaction Mechanism of a Chemical Reaction Using Kinetics, Dreyfus Institute Solvolysis of tert-Butyl Chloride, <http://www.usdallas.edu/chemdepot/Hendrickson/3121/solvolysis.htm>.

SURFACTANT CAPABILITIES OF SODIUM DIOCTYL SULFOSUCCINATE WITH CHANGING SALINITY. *GEORGE KIPLAGAT*, DAVID STEFFY AND AL NICHOLS, DEPT. OF PHYSICAL AND EARTH SCIENCES, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265

We investigated the surfactant, sodium dioctyl sulfosuccinate, that was used to help disperse the 2010 oil release in the Gulf of Mexico. This synthetic detergent disrupts the interfacial tension between the saltwater and crude oil phases. The disruption is maximum above the critical micelle concentration (CMC). The CMC for the surfactant was determined to be 0.09 moles/L at pH of 7.2 and a temperature of 21 degrees C. The CMC was determined not to be influenced by the salinity of the water. Solubilization tests indicated that tar balls generated from the spill dissolved in less than 24 hours after exposure to a solution of this surfactant.

SYNTHESIS AND UTILITY OF IODO-N,O-ACETONIDE AMINALS. *ZACH M. EVANS* AND ANDREW J. LAMPKINS, DEPT. OF CHEMISTRY & BIOCHEMISTRY, SAMFORD UNIV., BIRMINGHAM, AL 35229.

A central theme of our research is the synthetic modification of biologically-active peptides to achieve structurally related drug candidates with improved bioavailability profiles. As such, we are highly interested in precise manipulation of amino acid derivatives, especially those that can be further modified into scaffolds for potential pharmaceuticals. In this vein, we have developed and optimized efficient synthetic methods to create novel amino acid based iodo-N,O-acetonide aminals as platforms for early stage discovery. This poster will highlight the multicomponent reaction we have pioneered to create these chiral scaffolds. Further, we have demonstrated the utility of these scaffolds by successfully using them in syntheses of targeted derivatives. This poster will illustrate this utility by featuring our successful preparation of the N-Boc analog of the natural product statine using this methodology, and display our progress toward additional targets we are pursuing.

Southeastern Society of Environmental Toxicology and Chemistry Paper Abstracts

DO POTENTIALLY FUTURE PHARMACEUTICALS INCREASE ENVIRONMENTAL RISK: PRELIMINARY EVALUATION OF THE VENOM FROM TWO TARANTULA SPECIES. *KRISTIN SHIREY* AND JAMES RAYBURN, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265.

Tarantulas are the largest spiders in the world. The *Grammostola rosea* is found in Chile and the *Haplopelma lividum* is found in Thailand. Many types of venom are known to contain toxins which have pharmacological actions. A group of researchers have isolated this single

36-residue peptide, ω -grammotoxin SIA, from the crude venom of *Grammostola rosea*. This peptide is shown to block various ion channels, including, Ca^{+2} channels, which decreases the duration of action potential. This peptide is a potential new drug that has shown no negative side effects but the environmental risk is unknown. To obtain the venom for the experiment, the tarantulas were anesthetized using carbon dioxide. The tips of the fangs were placed into a vile and electric stimulation was applied at their fang base to stimulate venom flow. The venom was stored at $-20^{\circ}C$ until used. We performed a 96hr test with petri dishes with 20 embryos in each dish. Venom concentrations ranged from 0-0.2% (v/v). We recorded the mortality and the data was analyzed with PROBIT analysis using Tox tools. We were able to generate a 96 hr embryo LC50 and EC50 for both species. The *Grammostola rosea* venom had an approximate 96 hr LC50 of 0.1018% (v/v) and an EC50 of 0.091% (v/v). The *Haplopelma lividium* venom had an approximate 96hr LC50 of 0.06% (v/v) and an EC50 of 0.091% (v/v).

METAL CONCENTRATIONS IN SEDIMENTS FROM SELECTED SITES IN THE NORTHEASTERN GULF OF MEXICO. RUSSELL PRICE, AL NICHOLS AND DAVID STEFFY, DEPT. OF PHYSICAL AND EARTH SCIENCES, JACKSONVILLE STATE UNIV., JACKSONVILLE, AL 36265

An assay of six metals is being conducted on sediments from the Gulf of Mexico collected in October 2010 on board NOAA R/V Pisces. Sediment samples were collected along the continental shelf in the Gulf and analyzed for mercury along with five metals (vanadium, nickel, lead, chromium and thallium) associated with crude oil from the 2010 BP oil spill. Samples are being analyzed by ICP for the five metals known to be present in the well oil. Additional testing for mercury concentration is being conducted by cold vapor mercury analysis as part of an ongoing investigation of mercury distribution in the Gulf. The results for vanadium and nickel concentrations are being compared to those in sediment samples taken the fall before the oil spill. Vanadium and nickel concentrations can be used to identify the well of origin of crude oil, and their concentrations in the BP well are known. Vanadium levels have ranged from 1 to 7 micrograms/g and nickel levels have ranged from 1 to 8 micrograms/g in sediments samples collected 2010 and examined to date.

MOSQUITOFISH (*GAMBUSIA HOLBROOKI*) MICROARRAY DEVELOPMENT AND LABORATORY EXPOSURES TO ENDOCRINE DISRUPTING COMPOUNDS. ERICA K. ANDERSON, NANCY DENSLOW, AND DAVID BARBER, UNIVERSITY OF FLORIDA, GAINESVILLE, FL 32611; TIM BARGAR, UNITED STATES GEOLOGICAL SURVEY, GAINESVILLE, FL 32653

The Eastern mosquitofish (*Gambusia holbrooki*) is a bioindicator candidate for evaluating endocrine disrupting chemicals (EDCs). Male mosquitofish exhibit anal fin growth and female mosquitofish can also exhibit anal fin growth after androgen exposure. Masculinized female *G. holbrooki* are found at paper mill impacted sites, but the mechanisms responsible for this abnormality have not been determined. To reach the objective of developing *G. holbrooki* as a bioindicator for EDCs, the aims of this project are to develop a molecular tool for analyzing *G. holbrooki* gene expression and to determine if aromatase inhibition can cause abnormal anal fin growth. For aim one, a cDNA library was created with RNA from *G.*

holbrooki tissues using the MINT cDNA synthesis kit. Abundant transcripts were normalized and the cDNA library was sequenced using the Illumina Genome Analyzer Iix. Short sequences were assembled into longer contiguous sequences using *de novo* assembly methods (ABYSS) and well-annotated sequences will be used to generate a custom microarray. For aim two, *G. holbrooki* fry were treated with either an inhibitor of the aromatase enzyme (converts estrogen to testosterone), a positive control (androgen), or a vehicle control. Treatment with an aromatase inhibitor did not induce anal fin growth as it did in the positive controls. Further work will include microarray analysis on mosquitofish at a paper mill impacted site and androgen exposures to female mosquitofish.

NUTRIENT CONCENTRATIONS IN STORMWATER RUNOFF FROM VEGETATED AND NON-VEGETATED ROOFS. JULIE G. PRICE AND STEPHEN A. WATTS, DEPT. OF BIOLOGY. RONALD SHERROD, JASON T. KIRBY AND ROBERT W. PETERS, DEPT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING. MATTHEW WINSLETT, FACILITIES MANAGEMENT. UAB, BIRMINGHAM, AL 35294.

Vegetated roofs are considered environmentally-friendly alternatives to traditional roofs. Benefits derived from vegetated roofs, such as increased roof longevity, decreased roof heat flux, and decreased stormwater runoff, have been well documented. While the decrease in quantity of the runoff is beneficial, the quality of this runoff has not been well evaluated and is an important consideration in evaluating the effects of vegetated roofs on urban stormwater runoff. Transport of pollutants to the watershed can lead to eutrophication and decrease of downstream biodiversity. Preliminary studies were conducted at UAB to evaluate the N and P content of stormwater runoff from vegetated and traditional roofs. Three vegetated flat experimental mini-roofs, each with a monoculture of Sedum species, and two (non-vegetated) modified bitumen flat roofs were fitted with a 1-inch drain to divert stormwater runoff into a collection system. Following each rain event during June and July 2010, the collected water for each roof was analyzed using Hach test kits. Vegetated roofs released significantly more nitrogen in stormwater runoff than non-vegetated roofs, however the study was limited to very few rain events and the quantity of runoff from the vegetated roofs was low. Continuing research at UAB is further evaluating the quality and quantity of stormwater runoff from vegetated roof systems to determine benefits and environmental implications.

THE DETERMINATION OF ANTAGONISTIC INTERACTIONS BETWEEN ACRYLAMIDE AND SELECTED ANTIOXIDANTS USING XENOPUS EMBRYOS. JAMES R. RAYBURN, DEPT. OF BIOLOGY, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE AL, 36265 MENDEL FRIEDMAN AGRICULTURAL RESEARCH SERVICE, USDA ALBANY, CA 94710

Studies with the Frog Embryo Teratogenesis Assay (FETAX) have demonstrated that acrylamide, a compound present in processed plant-derived foods such as bread crust and potato fries, is a teratogen. Other studies showed that administration of acrylamide during organogenesis produced maternal and developmental toxicity in mice and maternal, but not developmental, toxicity in rats. L-cysteine, N-acetyl Cysteine are precursors to making Glutathione which has antioxidant properties. The FETAX assay was chosen because the

embryos develop externally and are transparent which make them an excellent choice for evaluating developmental toxicity. This assay has both human health and environmental implications. The objective of the present study was to determine if L-cysteine, N-acetyl-L-cysteine and glutathione could be used to reduce acrylamide toxicity and teratogenicity. To accomplish this objective, we investigated the effect acrylamide alone and then the effects of each test chemical on mortality, malformation and embryo length induced by select concentrations of acrylamide using the standardized FETAX assay. Bred frogs with human chorionic gonadotropin, collected and dejellied the eggs with 2% L-Cysteine. At small cell blastula stage we placed the embryos into test solutions (renewed every 24 hrs). The test was performed in an incubator at 24°C in the dark. At the end of 96 hrs we counted survivors, malformed and measured embryo length. We selected concentrations of acrylamide that induced 100% malformations and mortality to test the anti-teratogenic potential of each test chemical. The data were analyzed using Systat ANOVA analysis to determine if the test chemicals significantly reduced the toxicity of acrylamide. The data indicate that each test chemical had the ability to protect the embryos against acrylamide induced malformations and mortality to different degrees. These results suggest that these chemicals have the potential to protect fetuses of against acrylamide-induced malformation; and demonstrate the potential utility of FETAX for determining protective effects of other dietary ingredients against acrylamide toxicity.

VISIBLE LIGHT PHOTOCATALYSIS FOR WATER DETOXIFICATION, *SESHA S. SRINIVASAN*, PRAKASH C. SHARMA, DEPARTMENT OF PHYSICS, COLLEGE OF ENGINEERING AND PHYSICAL SCIENCES, TUSKEGEE UNIVERSITY, TUSKEGEE, AL 36088,

Purification of water from organic contaminants, disinfection of water and air, destruction of bacterial activity, non-polluting power generation (including solar energy, reduction or stabilization of CO₂ and photodegradation of deep horizon oil spill are the vital areas for urban, economic, environmental and industrial developments in the United States. Success in all of these areas strongly depends on the development and deployment of efficient, inexpensive, environmentally friendly and chemically stable catalysts and photocatalysts. Titanium dioxide (TiO₂) is widely used in many photocatalytic and water splitting applications because of its high stability, low cost, non toxic, high oxidation potential and chemically favorable properties. However, it can only utilize the ultraviolet portion of the solar spectrum, which results in low total efficiency of such catalyst in the sunlight energy utilization. Any improvements in photocatalytic efficiency of TiO₂ or development of other novel and new generation photocatalysts towards shifting their activity to the visible portion of the solar spectrum will have a significant impact. Multi prong approaches of synthesizing novel and modified TiO₂ based nanocomposites have been extensively investigated by (i) surface carbonization or nitrogen doping (ii) mechanochemical milling and (iii) semiconductor nanoparticulate coupling to enhance the photocatalytic response in the visible wavelength range. The significant reduction of the band gap (E_g) and understanding the mechanism for tailor-made properties are discussed in detail. Keywords: Photocatalysis, nitrogen doping, TiO₂, detoxification, characterization, surface-property relation.

Southeastern Society of Environmental Toxicology and Chemistry Poster Abstracts

CANCER MORTALITY RATES IN ALABAMA COUNTIES ASSOCIATED WITH PCB CONTAMINATION. RONALD N. HUNSINGER, KASANG M. BUSAMBWA, WILLIAM C. COCHRAN, JOHNA S. LEDLOW, *BENJAMIN G. MEADOWS*, ERIN M. RAMSEY, JENNIFER N. RASTEGAR AND ROBERT A. STANFIELD, DEPT. OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES, SAMFORD UNIVERISTY, BIRMINGHAM, AL 35229

From the 1930's to the 1970's, Monsanto Chemical Company operated a plant in Anniston, AL (Calhoun County) which produced a major supply of the country's polychlorinated biphenyls (PCB's). In the 1990's, health concerns were raised over the environmental contamination of PCB's in the plant area and even the entire county. In 2000, the Environmental Defense Fund Scorecard ranked Calhoun County the worst of 30% of US counties with regards to major chemical releases. Those living closest to the plant, reported a number of health concerns with cancer, cardiovascular-, respiratory- and skin-problems ranking the highest reports, respectively (ATSDR Health consultation, 2000). Also, the Environmental Defense Fund Scorecard predicted a high percent "added cancer" risk from hazardous air pollutants (1990). The purpose of this study was to examine actual cancer mortality rates in Calhoun County and the surrounding areas affected by PCB contamination using actual data acquired from the Alabama Department of Health Cancer Registry data base for years 2005 - 2007. These rates were compared to a demographically similar control county (Blount) and to state rates. Since PCB contamination also extended to Lake Logan Martin, rates in an impacted county (St. Clair) were also compared to a demographically similar county with a recreational lake (Tallapoosa). Means were compared via ANOVA statistical applications, followed by a Newman-Keuls multiple range test. No differences in the overall cancer mortality rates were found in either Calhoun- or St. Clair-Counties, as compared to the overall state rate. Furthermore, St. Clair County rates did not significantly differ from the demographic control county, Tallapossa. Additionally, non-cancer/non-alcoholic liver disease rates did not differ between test counties and state rates.

EVALUATION OF AQUEOUS EXTRACT OF VIRGINIA PINE (PINUS VIRGINIANA) BY EXAMINING TIME TO METAMORPHOSIS AND GROSS GONADAL STRUCTURE OF AFRICAN CLAWED FROGS (XENOPUS LAEVIS): DOES NATURAL PINE LEACHATE CAUSE FEMINIZATION IN FROGS? *LINDSEY MINTON AND JAMES RAYBURN. JACKSONVILLE STATE UNIVERSITY, BIOLOGY DEPARTMENT.

Estrogenic compounds are introduced into amphibian habitats through a multitude of mediums, the majority of which are influenced or created through human mechanisms, including (but not limited to) water treatment facilities and multiple areas within the field of logging and lumber/pulp mills. Couple this with the fact that amphibians are highly reliable environmental indicators, and the genus *Xenopus* becomes ideal test subjects on a wide variety of environmental problems. Some naturally occurring estrogens are found in the

environment as compounds in some pine tree species and have been determined to cause estrogenic changes in fish. For our test, we exposed groups of *X. laevis* in tanks to concentrations of pine tree extract (from Virginia Pine, *Pinus virginiana*) from 96hrs after fertilization until metamorphosis (NF stage 66), including the stage of gonadal differentiation. Dosages of the pine tree extract were given on biweekly basis using test concentrations of 1% (high) and 0.5% (low) with a estrogen given to the positive control groups. Throughout our experiment, the frogs were kept in tanks of 20L with a controlled temperature range of 25-29° Celsius. Any effects from the pine tree extract will be determined by looking at factors such as: length of time to metamorphosis, malformations, mortality, and histological observations. The study is focusing on determining the best techniques to observe gonadal mutations and malformations of male and female African Clawed Frogs after metamorphosis. These evaluations will be examined using histological slides, staining, and light microscopy and will focus on looking for mutations or malformations at the major sites of primary sexual characteristics, such as the ovaries and testes.

THE POTENTIAL FOR OLIVE PUMICE EXTRACT TO REDUCE THE DEVELOPMENTAL TOXICITY OF ACRYLAMIDE USING THE FROG EMBRYO TERATOGENESIS ASSAY-XENOPUS. BRANDON BLACKBURN, JSU, JACKSONVILLE, AL. MENDEL FREIDMAN, U.S.D.A., ALBANY, CALIFORNIA. JAMES RAYBURN, JSU, JACKSONVILLE, AL.

Acrylamide is an organic toxin that can be found in certain foods due to cooking at high temperatures and is considered a carcinogen. This experiment examines if olive pumice extract (OPE) can affect the developmental toxicity of acrylamide in *Xenopus laevis* embryos. The interaction between the acrylamide and OPE was examined using Frog Embryo Teratogenesis Assay-Xenopus (FETAX). The embryos (320) that were selected were divided into groups of 20 and placed into 16 petri dishes with 8 ml of a FETAX test solution. The 16 dishes were separated into four groups: One- FETAX Control Solution, Two-Acrylamide Positive Control (0.085 mg/ml) Solution, Three- OPE Test 1 (0.085 mg/ml) Solution, and Four- OPE (0.085 mg/ml) and Acrylamide (0.085 mg/ml) Solution. Every 24 hours of the experiment, the solutions in each of the petri dishes was replaced with fresh solutions, the dead *Xenopus laevis* embryos were removed, and the living embryos were counted. At 96 hours, the *Xenopus laevis* embryos were examined for malformations, the number of surviving embryos, and lengths of each embryo. The ANOVA with the Bonferroni Adjustment Post Hoc Test was used to determine differences. The ANOVA Bonferroni Multiple Comparison analysis showed that the effects of OPE reduced the effect acrylamide on the mortality and length. These results indicate that the OPE had the potential of reducing the toxicity of the acrylamide in foods.

Industry, Environmental, and Earth Science Paper Abstracts

INCOME GAP AND POVERTY IN THE UNITED STATES OF AMERICA BY STATE AND REGION 1990-2009, *TESHOME GABRE*, FESSEHA GEBREMIKAEL, CONSTANCE WILSON AND MOSES EBEN, DEPT. OF COMMUNITY PLANNING AND URBAN STUDIES, ALABAMA A&M UNIVERSITY, NORMAL, AL, 35762.

Over the past several decades, the United States has experienced a rising standard of living, with real GDP per capita more than doubling, between 1959 and 2004. In contrast, living standards among some of the society groups seem to have stagnated, creating pockets of poverty. Some studies indicate that globalization, declining manufacturing jobs, expansion of low-wage service and trade jobs, and weakening of labor market institutions have contributed to the erosion of wages especially for workers without technical or college training. This paper examines the poverty level in the 50-states of the United States, and the four regions of the country (Northeast, Midwest, West, and South) from 1990 through 2009, and assesses how poverty rates and income gaps have changed over time. It also explores race, age, educational attainment and income gaps between the state and the regions, respectively. Data was collected from U.S. Census of Population 1990-2009, Geolytics Census CD, 1990-2000 and from various electronics sources. To analyze the data, Excel and SPSS were used. The study points out that, in each state the White population consistently had higher incomes and lower poverty rates as compared to Blacks and Hispanics. Educationally as well, Blacks and Hispanics show less years of education. Level of urbanization of the states also made a difference. More urbanized states such as New Jersey, Nevada and Massachusetts had higher median family incomes as compared to less urbanized states, such as Mississippi, West Virginia and Alabama, indicating more poverty in non-urbanized regions and states of the country. This study also indicates that there is a strong link between income, race, educational attainment, age and level of urbanization of a state or a region and its level of poverty.

Engineering and Computer Science Paper Abstracts

***QICHAO LIU*, DEPT. OF COMPUTER AND INFORMATION SCIENCES, UNIV. OF ALA., BIRMINGHAM, AL 35294. *BARRETT BRYANT*, DEPT. OF COMPUTER AND INFORMATION SCIENCES, UNIV. OF ALA., BIRMINGHAM, AL 35294. *MARJAN MERNIK*, UNIV. OF MARIBOR, 2000 MARIBOR, SLOVENIA.**

In software engineering, new technologies and methodologies have been developed with the aim of simplifying the software development process and improving software productivity. Model-driven engineering is considered as one potential alternative to the classical code-based software development. A current challenge in model-driven engineering is the model evolution problem, which is focused on maintaining the relationships among modeling artifacts in the presence of change. A variety of model-driven technologies have been widely researched and applied both in academia and industry to address the model evolution problem. Reverse engineering technologies have been applied in many areas including software engineering to address issues of software evolution. This paper describes one

application of reverse engineering, using an approach that conducts Metamodel Inference from Model Instances (MIMI), towards addressing a specific aspect of the model evolution problem related to metamodel evolution. In order to illustrate the problem clearly, a set of examples are used to present our experimental results from applying MIMI on diverse industry-focused domains.

COMPUTATIONAL METHODS FOR ANALYZING CHILDREN'S NARRATIVES. KENNY BLACKMON, KENB@UAB.EDU, DEPARTMENT OF COMPUTER AND INFORMATION SCIENCES, UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, AL 35233. THAMAR SOLORIO, SOLORIO@UAB.EDU, DEPARTMENT OF COMPUTER AND INFORMATION SCIENCES, UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, AL 35233. MANUEL MONTES-Y-GÓMEZ, MMONTESG@INAOEP.MX, DEPARTMENT OF COMPUTATIONAL SCIENCES, NATIONAL INSTITUTE OF ASTROPHYSICS, OPTICS AND ELECTRONICS, CALLE LUIS ENRIQUE ERRO 1, 72840., SANTA MARÍA TONANTZINTLA, PUEBLA, MEXICO.

This paper discusses methods used to analyze children's narrative transcripts. In the analysis of children's transcripts, we hope to find ways of identifying speech disfluencies. We explore segmentation of transcripts as a way to model story elements as well as utterance level clustering and transcript level clustering. Through these techniques we hope to create models that can be used to detect anomalous transcripts. We also discuss special characteristic's of children's narratives that make the especially hard to analyze when compared to other text and the added layer of complexity when dealing with bilingual transcripts.

DEVELOPING A GAME-INSPIRED CURRICULUM FOR AN INTRODUCTORY PROGRAMMING COURSE. DAVID C. THORNTON AND AARON L. GARRETT, DEPT. OF MATHEMATICAL, COMPUTING, AND INFORMATION SCIENCES, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265.

In this project, the investigators are exploring the use of open-source learning management technology to support a game-inspired pedagogical approach, called Gamegogy, to computer science, mathematics, and psychology courses. These modules, along with the corresponding game-inspired curricula, will be alpha- and beta-tested in a university-level introduction to computer programming course. At every point, the effectiveness of a game-inspired pedagogy will be measured along multiple dimensions using the learning outcomes identified for students in these courses. Gamegogy courses will contain many game-based elements, such as experience points, leveling, factions, quests, explorations, group quests, mini-bosses, avatars, leaderboards, trophies, and walkthroughs. Each of these elements will be tied to sound pedagogical practices such as scaffolding, mastery-based learning, choice, immediate feedback, and self-paced progress which the investigators believe will substantially increase student motivation and performance in STEM courses. The game-inspired pedagogy approach investigated in this proposal has the potential to both reshape and revitalize curricula across all STEM disciplines at all levels of study. While many of the concepts and components of this proposal have existed for years, they have never been applied comprehensively, with or without a game-inspired approach, nor has their application been

supported with significant technology. It is the investigators' hypothesis that such an approach can be used to unify the various pedagogical techniques, simplify their administration, and rectify many of their shortcomings.

ENHANCING IMAGES USING SUPER-RESOLUTION. JONATHAN BROOKS JACKSONVILLE STATE UNIV. 700 PELHAM ROAD NORTH JACKSONVILLE, AL 36265-1602

The world of digital imaging has improved vastly over the past few years, but even with advancing camera-recording technology, many image sequence situations still suffer from degradations. With this being such a big issue, video restoration and enhancement is a goal of the image enhancement community, but with improvements, sometimes come risk. We plan to minimize the risk and implement an algorithm that improves the quality and enhances each image within a sequence by using super-resolution. Super-resolution is the technical term for a set of methodologies that upscale, up-size, or up-convert an image or sequence of images. A common technique of super-resolution is based on many different images combined together to form one up-sized image. The idea is based on the fact that each image in a sequence provides small amounts of additional information. Therefore, one can believe that an object within an image, that needs to be enhanced, must be in motion. If a sequence of images is the exact same image over and over, no additional information can be gathered. Once all information is extracted from each image, other frames are constructed to form a new enhanced image that is of higher quality.

GRAMMAR INFERENCE FOR DOMAIN SPECIFIC LANGUAGES AND SPAM CLUSTERING. BARRETT BRYANT, ALAN SPRAGUE, UPENDRA SAPKOTA , CIS DEPT., UNIV. OF ALA. AT BIRMINGHAM, MARJAN MERNIK, UNIVERSITY OF MARIBOR, MARIBOR, SLOVENIA.

Grammar inference (GI) is the induction of Context Free Grammars (CFGs) from samples. Much ongoing research work focuses on generation of CFGs using different approaches and we propose a new approach in this area. CFGs constitute an important class of grammars and are widely used in programming language descriptions, natural language processing, compilers, spam specification and other areas of software engineering. As CFGs can represent the syntactic structures of languages/sentences, they can be applied in the areas like Spam Clustering and Domain Specific Languages (DSL) learning, the languages dedicated to a particular problem representation/solution technique. Using GI, we want to generate DSL specifications when only the DSL samples are available. The use of the n-gram approach to the sample data generates basic grammars and the Cocke-Younger-Kasami (CYK) CFG parsing algorithm further generalizes the grammars. Application of statistical methods like Expectation-Maximization (EM), an iterative algorithm, improves the parameters of our model by re-estimating them. GI using the Inside/Outside algorithm, which is a special case of EM algorithm, helps in generation of Stochastic Context Free Grammars (SCFGs). We also use the GI approach on spam clustering which tries to group spam messages according to its authors.

**IMPROVED TEXT CLASSIFICATION BY DETECTING OUTLIERS GLOBALLY.
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MONTES-Y-GOMEZ, NATIONAL INSTITUTE OF ASTROPHYSICS, OPTICS AND
ELECTRONICS, PUEBLA, MEXICO.**

Supervised approach for document classification uses machine-learning algorithms to classify documents into pre-determined classes based on their respective domains or topics. However, at times the content of few documents in the data-set can be unrelated to its particular training domain, thus, resulting in a reduction in the accuracy of the classifiers used. These documents are known as the outliers and need to be eliminated from the collection. A better way to determine outliers in a collection would be to use a measure that can reflect the cohesiveness between the documents in one class as well as the separation of the documents in that class with those of the other classes in the corpus. The former can be thought of as a local method which uses only the information embedded in a document's own class. In our work, we propose to use the Silhouette Coefficient measure to identify the relatedness of the classes in a corpus and thus, identifying those documents not so related to their labeled class. Silhouette Coefficient, can be called a global method because it calculates the integrity of the documents in a class by taking into consideration its separation from the documents in the other classes. We have analyzed the performance of various classification algorithms before and after eliminating the undesirable document objects using the above method. Our results show an improvement in the accuracy of the classifiers after the outliers were detected and eliminated.

**PARALLEL AND DISTRIBUTED COMPUTING WITH MAP-REDUCE.
SRINIVASARAO KRISHNAPRASAD, DEPT. OF MCIS, JACKSONVILLE ST. UNIV.,
JACKSONVILLE, AL 36265.**

Advances in processing architectures like multiprocessors, multi-core processors, parallel processors and clusters begs the question of how to exploit concurrency in applications and develop concurrent programs on these computing facilities. Application developers should acquire new skills to write parallel and distributed programs. Many of the issues involved here include dividing the problem into various concurrent tasks, allocating tasks to available processors, inter-task communication and synchronization issues, effective use of processor resources via load balancing and fault-tolerant computing to combat processor failures. It is highly desirable from productivity and reliability point of view to simplify the program development process by hiding most of these difficult issues. Jeffrey Dean and Sanjay Ghemawat of Google developed a distributed computing tool named Map-Reduce that provides a simple programming abstraction for application development suitable for large-scale data manipulation and result generation requirements of Google. Map-Reduce uses automatic parallelization and distribution of work load, allows for highly scalable computation and facilitates fault-tolerance. The user specifies the desired computation with two functions: Map() and Reduce(). The input dataset is automatically partitioned into several chunks which are concurrently handled by a set of map() calls that are distributed across several processors. The run-time system orders the outcome of the map functions into several groups, one for each Reduce() function. Calls to reduce are distributed across several processors. Fault tolerance is realized by detecting failures and rolling appropriate

computations to prior states and re-executing them. Apache Hadoop provides an open-source, Java-based implementation of Map-Reduce.

REPRESENTATION OF DOMAIN-SPECIFIC MODELING LANGUAGES: AN INFORMATION THEORY APPROACH. ZEKAI DEMIREZEN AND BARRETT R. BRYANT, DEPT. OF COMPUTER AND INFORMATION SCIENCE, UNIV. OF ALA. AT BIRMINGHAM, AL. MURAT M. TANIK, DEPT. OF ELECTRICAL AND COMPUTER ENGINEERING, UNIV. OF ALA. AT BIRMINGHAM, AL.

Model-Driven Engineering (MDE) has been shown to increase productivity and reduce overall development cost. The concepts advocated by MDE focus on abstractions associated with a specific domain while providing tailored modeling languages for domain experts. Domain-Specific Modeling Languages (DSMLs), used within the MDE context, enable end-users who are domain experts to participate in software development tasks and to specify their own programs using domain concepts in the problem space. This shift in the emphasis on domain concepts for software development introduces fundamental challenges, which drive new research in DSMLs. For example code generation, validation, verification, and different kinds of analysis require a precise representation of behavioral semantics of DSML. Most modeling toolsets do not allow the representation of DSMLs to be defined in a way which would support such desirable analysis and generation tasks effectively. This research presentation will introduce a modeling strategy originating from the domain of information theory for the representation of behavioral semantics of DSMLs. Two major challenge areas that will be discussed in the representation of behavioral semantics of DSMLs are: (i) utilizing formal tools to provide a mathematical foundation for reasoning about DSML designs; (ii) decomposing behavioral semantics of DSML into subsections enabling to represent them as information sources and discrete communication channels, thereby providing a new formal foundation for analysis.

SUPER RESOLUTION VIA SINGLE SOURCE INFERENCE: A REVISED METHODOLOGY. JEREMY STRAUB, JACKSONVILLE STATE UNIVERSITY. 700 PEHLAM RD N, JACKSONVILLE, AL

Super resolution is a set of techniques which are used to enhance an image or set of images to create an output image which is of a higher resolution than the effective resolution of a single input image. It has applications in machine vision, remote sensing, intelligence, medical and a plethora of other fields. The proposed approach makes an inference from a single source image. The inference engine relies on a database of known patterns that it is trained with prior to being presented with the source image. Each database record contains a high, medium and low resolution version of the applicable pattern. The database can be customized to a particular application or contain patterns from a wide variety of sources for general use. The low resolution version of the pattern is used to identify a set of candidate patterns which roughly match the presented image area. The medium resolution pattern is used to select the winning pattern which is applied to the super image. For colored images, this process is performed on a per-color basis. The approach is designed to incorporate a commercially available database product. It, thus, takes advantage (without development cost) of features in commercial database products which include searching, caching and optimization. The size

of the small, medium and high resolution patterns can also be varied as the situation dictates. These two factors should allow maximization of the two key super resolution performance evaluation metrics: speed and accuracy.

SUPPORTING ASPECT-ORIENTED MODELING THROUGH A DEMONSTRATION-BASED MODEL TRANSFORMATION APPROACH. YU SUN, DEPARTMENT OF COMPUTER AND INFORMATION SCIENCES, UNIVERSITY OF ALABAMA AT BIRMINGHAM. BIRMINGHAM, AL 35294

The task of weaving aspect models in Domain-Specific Modeling Languages (DSMLs) is traditionally supported by manual model editing or using model transformation languages. However, these approaches are challenging to use for those unfamiliar with the specific details of a modeling language and the underlying metamodel, which presents a steep learning curve for many users. This paper presents a demonstration-based approach to automate the weaving process of aspects in DSMLs. Instead of writing model transformation rules explicitly, users demonstrate how to weave the aspect by directly editing the concrete model instances and simulating the weaving processes. By recording a user's operations, an inference engine analyzes the user's intention and generates generic model transformation patterns automatically, which can be refined by users and then reused to automate the same task in other models. Using this approach, users are able to automate the weaving tasks without learning a complex model transformation language. In addition, because the demonstration is performed on model instances, users are isolated from the underlying abstract metamodel definitions. Our demonstration-based approach has been applied to several scenarios, such as auto-scaling and model layout. The specific contribution in this abstract is the application of the demonstration-based approach to capture crosscutting concerns representative of aspects at the modeling level.

THREAD PROCESSING AND COMPUTATION SCIENCE BY R. PHILLIP BORDING PURPOSE BUILT COMPUTING MADISON, ALABAMA 35758 PHILBORDING@HOTMAIL.COM

Threaded programming is paradigm that is now the norm for computer systems. The basic process is well known as it has been the basis for all Von-Neumann architectures in the popular microprocessors. As the Moore's law scaling of performance improvements is reaching physical limits the new direction for enhancements is to use more logical processes. The form of these additional logic circuits is the replication of the processor, and hence the notion of a multi-core central processing unit. The programming of these additional cores is difficult – as with any sense of multiplicity – it requires coordination and organization in the systems design and execution. These multi-processing systems have been in existence for decades but the construction of a single chip multi-core system is recent. The trend in VLSI chip production to using finer scale line transistors is providing too many to use without major new features. Thus, the number of cores on a chip is the variable that can change. The integration of the board level parts into the microprocessor is almost complete, the last significant chip to be added to the complete the process will be the inclusion of the graphical processing chip. The core trend is also impacting the graphics chip design – with hundreds of

light weight thread processors. Thus the two merging forces micro's and graphics processors are dema

Engineering and Computer Science Poster Abstracts

MAXIMIZING THE EFFICIENCY OF A TITANIUM DIOXIDE DYE-SENSITIZED SOLAR CELLS, SHAWN S TUTEJA. SENIOR AT THE ALTAMONT SCHOOL BIRMINGHAM, AL

The project, Maximizing the Efficiency of a Titanium Dioxide Dye-Sensitized Solar Cell, sought to increase the electrical output and storage capacity of a dye-sensitized solar cell. To perform this experiment, dye-sensitized solar cells were built using titanium dioxide paste on the electrode and carbon on the counter electrode. The electrode was soaked in raspberry dye overnight, and silica gel was melted in methanol. The gel was applied to the electrode, counter electrode, and both the electrode and counter electrode in three different cells. The control of the experiment was the cell with no silica gel applied to it. The cells were exposed to a 250-Watt Halogen Light for one hour. The voltage was recorded using a multimeter, and then, the cells were left in the dark for one hour. Another reading was taken, and this procedure was repeated five times using the control and the three different cells with various amounts of silica gel on them. The results show that the silica gel increased the electrical output and the storage capacity of the solar cells by up to 97.37%. This is due to the fact that silicon has unique properties as a metalloid and acts as a preservative by regulating the humidity

Health Science Paper Abstracts

AN INTEGRATIVE DESCRIPTION OF HEART HEALTH IN AN ELDERLY UNDERSERVED POPULATION USING THE ROY ADAPTATION MODEL KYLE S. BATEMAN (DR. ELLEN BUCKNER, DR. LINDA ROUSSEL) USA COLLEGE OF NURSING, HAHN 3082, 5721 USA DRIVE N., MOBILE, AL 36688-0002

Elderly patients with heart disease are met with many challenges that necessitate changes in lifestyle to adapt to developing limitations. The Roy Adaptation Model (RAM) is an effective model to use to holistically assess adaptation of the individual. The aim of this study was to establish baseline data for Our Neighborhood Healthcare Clinic Heart Health Program while utilizing the Roy Adaptation Model to examine the relationships among the four adaptive modes and overall health in an elderly population. This descriptive theoretical study applied quantifiable measures to correspond with the adaptive modes of the Roy model. These individual measures were then used to assess the levels of integration which correspond to the participants' overall degree of adaptation. Representing the physiologic mode, the Framingham 10-year Coronary Heart Disease Risk was calculated from measures of blood pressures, a lipid profile and other factors that increase the chance of developing heart disease. For the self-concept mode, the Newest Vital Sign was utilized to quantify health literacy. In the role function and interdependence modes, the Interpersonal Support Evaluation List was used. The SF-12 was used to assess quality of life as a measure of overall

health. Data for this IRB approved study were collected over several weeks at a senior citizen's day program at a local community center. Low literacy versions of the informed consent and surveys were used. Using the SPSS® software, data were analyzed using statistical regression to identify the levels of correlation between adaptation and overall health as measured with the aforementioned instruments. A theoretical analysis was also done using the Roy Adaptation Model and implications for how an assessment of these modes of adaptation can be applied to nurse-managed community-based care. 35 elders participated in the study aged from 57 to 91 years of age with the mean being 76 years old. It is anticipated that there will be a statistically positive correlation between the 4 adaptive modes and, when statistical regression is applied, will demonstrate a positive correlation to overall health.

CLINICAL SIMULATION: AN INNOVATIVE TEACHING TOOL.*BEVERLY MYERS, MA, RN, PHD, CRNP, LUCILLE IRBY, RN, DON, STELLA ERVIN, RN, MSN, ARTILYA JONES, RN, CRNP, YOLANDA SMITH, RN, MSN & ALLYSON MADDOX, NURSING PROGRAM TRI-STATE INSTITUTE BIRMINGHAM, ALABAMA.

AIM: The aim of this presentation is to discuss the use of clinical simulation in the education of entry-level nursing students. BACKGROUND: Nursing education is rooted in an experiential approach to learning. Nurse Educators are continually challenged to implement teaching strategies to prepare entry-level nursing students to deal effectively with advances in technology, increased patient acuity, and mandates for patient safety. The use of clinical simulation can offer entry-level nursing students countless opportunities to practice and master skills in a safe environment without causing harm to a live patient. SIGNIFICANCE: The shortage of clinical placement sites, along with concerns for patient safety, often limits entry-level nursing students' active participation in high-risk patient care situations. As a result, many entry-level nursing students fail to develop the teamwork, delegation, and prioritization competencies needed for a smooth transition into practice. DISCUSSION: Clinical simulation can provide unique opportunities for entry-level nursing students to actively participate in high-risk patient care situations. For example: entry-level nursing students can monitor realistic changes in pulse, respiration, blood pressure, and pulse oximetry readings in response to their nursing decisions and patient care interventions. IMPLICATIONS: Nurse Educators can provide entry-level nursing students with immediate feedback on strengths and areas of improvement. Videotaped clinical simulations can be analyzed to monitor trends in skill proficiency across time and to set performance standards.

COACHING AS A NURSING INTERVENTION FOR UNDERSERVED COMMUNITY-BASED ELDERS: A PILOT CASE STUDY PROGRAM. *MEREDITH DAVIS, ELLEN BUCKNER, LINDA ROUSSEL, AND CLISTA CLANTON, UNIVERSITY OF SOUTH ALABAMA, MOBILE, AL, 36688-0002

In order for individuals to successfully manage diabetes, it is imperative that there is a level of knowledge that encompasses all aspects of healthcare. Not only must individuals know the importance of monitoring blood glucose and medication administration, but a level of understanding regarding diet, exercise, and living with diabetes must also be considered to complete the puzzle that is diabetes. The purpose of this IRB approved pilot descriptive case

study was to understand the role that coaching plays on overall health and chronic conditions such as Diabetes Mellitus and Coronary Heart Disease (CHD) in underserved elderly individuals. Participants were part of a nurse-managed Our Neighborhood Healthcare Clinic (ONHC) Outreach Program. The Framingham Risk Score for CHD, Literary Assessment for Diabetes and foot condition were assessed prior to and following intervention. An eight week pilot coaching program was initiated based on the coaching tool “Meter, Meds, Meals, Move, and More”, which focuses on monitoring blood glucose, medications, eating healthy, active lifestyles, and solving diabetes related health and social issues (Ulrich & Abner, 2010). Coaching was implemented weekly with five individuals who meet specified inclusion criteria. Diaries were issued to each participant and used as a tool to record general health information, blood glucose measurements, daily food intake, daily exercise, and psychosocial response to self-management. Parameters of coaching were evaluated by nurse and client in order to determine feasibility for establishing long term programs. Data collection and intervention are in progress.

MEASUREMENT OF CYTOKINES IN BIOLOGICAL FLUIDS. JONATHAN L. BLANDFORD BIOMEDICAL SCIENCE, UNIVERSITY OF SOUTH ALABAMA, MOBILE, AL 36688. LEWIS K. PANELL, PH.D. PROTEOMICS AND MASS SPECTROMETRY AT THE UNIVERSITY OF SOUTH ALABAMA MITCHELL CANCER INSTITUTE, MOBILE, AL 36604

The study of low abundance proteins, such as cytokines, is a problem when highly abundant proteins are also present. However, these low abundant proteins can be biomarkers in certain conditions. Cytokines are small (6-70kDa), hormone-like proteins that have critical roles in immune system control. Their low concentration can make them difficult to detect. Being able to detect these low abundance proteins in non-standard biological fluids could lead to significant advancements in biological analyses. This research project approaches the analyses using three methods: enzyme linked immuno-sorbent assay (ELISA), western blot, and mass spectrometry. During the project I targeted one cytokine: tumor necrosis factor-alpha (TNF- α) since it is one of the lowest concentration cytokines under normal conditions. This project attempts to detect the cytokine in non-standard biological fluids. ELISA failed in that it would not work when samples stored under denaturing conditions from the biobank were used. The western blot method was able to be performed correctly but, did not detect any TNF- α in any samples. Sensitivity could have been an issue for this method. Mass spectrometry, using selected reaction monitoring (SRM) in an Orbitrap mass spectrometer, was a successful method even with a sample diluted up to 125x. Thanks to the National Science Foundation's financial support (Grant # 0751684). Thanks to Dr. Julio Turrens, Ph.D. for my acceptance into the program and his co-mentoring throughout the program. Also, I appreciate the training of Dr. Lewis Pannell, Ph.D.

THE ALABAMA SCHOOL NURSE RESEARCH NETWORK: BUILDING A STATEWIDE INFRASTRUCTURE FOR SCHOOL NURSE RESEARCH. *ELLEN B. BUCKNER*, UNIVERSITY OF SOUTH ALABAMA, MOBILE, 36688-0002; AND *SHERRY D. MARBURY*, ALABAMA STATE DEPARTMENT OF EDUCATION, MONTGOMERY, AL, 36130-2101.

The purpose of this project is to initiate a statewide steering committee and consultation necessary to build an infrastructure for school nurse research in Alabama. A partnership was developed to create the Alabama School Nurse Research Network (ASNRN), a bi-directional network to (a) design and conduct research and (b) positively influence policy development, practice, and decision-making for school health in Alabama. Legislation enacted in 2009 requires each local system to employ school nurses whose responsibilities include annually providing a full, comprehensive assessment of all student health needs for their schools. The Alabama Electronic Health Record for all students was instituted as a major new resource offering new possibilities of data access for secondary analysis at the state level. The ASNRN is being developed through collaboration between the University of South Alabama College of Nursing (USACON), and the Alabama Department of Education (SDE), Prevention and Support Services Section. It is funded by the National Association of School Nurses (NASN) in association with the American Nurses Foundation. The Network will promote identification of research questions, design of research and testing of interventions to improve child health in school settings. It will enlist school nurses across Alabama in implementation of studies across multiple sites. These activities will pilot a process for accelerating nursing research in school settings resulting in evidence-based practice to inform policy development for school health and school nursing practice.

VENTURING INTO UNFAMILIAR TERRITORY: AN ASTHMA CAMP DOCUMENTARY. *LANCE P. MAILLOUX*, UNIVERSITY OF ALABAMA SCHOOL OF NURSING, UNIV. OF ALA. AT BIRMINGHAM, BIRMINGHAM, AL 35233.

This paper describes a project plan to show the efficiency of asthma education in a camp setting, the disease itself, and the reasons why a documentary film could improve the efficiency of both even further. Asthma is a complicated disease with a language all its own and this article describes the language and other details of this disease. I propose making a documentary film that will help in changing perceptions about asthma education and treatment in both a professional and personal light. I had little involvement in filming children and really in filming people in general with my first documentary so while this will be very different, I am still confident. Documentary filmmaking is a very time consuming process so the hour requirement will be no problem to complete. The asthma camp that I will be filming is the Young Teen Asthma Camp and it takes place at a local camp, Camp Winnataska, which is located in the Leeds/ Pell City area. Many children who have asthma have not been allowed to do some of these activities by their parents for fear of the children having an asthma attack. This article proposes using a documentary as a tool in which the parent's and children affected by asthma can learn more about the disease in an entertaining and educational way.

Health Science Paper Abstracts

CLINICAL SIMULATION: AN INNOVATIVE TEACHING TOOL, BEVERLY J. MYERS, RN, MA, PHD, CRNP, LUCILE IRBY, RN, DON, STELLA ERVIN, RN, MSN, ARTILYA JONES, RN, MSN, CRNP, YOLANDA SMITH, RN, MSN & MS ALLYSON MADDOX, NURSING PROGRAM, TRI-STATE INSTITUTE, BIRMINGHAM, ALABAMA.

AIM: The aim of this presentation is to discuss the use of clinical simulation in the education of entry-level nursing students. **BACKGROUND:** Nursing education is rooted in an experiential approach to learning. Nurse Educators are continually challenged to implement teaching strategies to prepare entry-level nursing students to deal effectively with advances in technology, increased patient acuity, and mandates for patient safety. The use of clinical simulation can offer entry-level nursing students countless opportunities to practice and master skills in a safe environment without causing harm to a live patient. **SIGNIFICANCE:** The shortage of clinical placement sites, along with concerns for patient safety, often limits entry-level nursing students' active participation in high-risk patient care situations. As a result, many entry-level nursing students fail to develop the teamwork, delegation, and prioritization competencies needed for a smooth transition into practice. **DISCUSSION:** Clinical simulation can provide unique opportunities for entry-level nursing students to actively participate in high-risk patient care situations. For example: entry-level nursing students can monitor realistic changes in pulse, respiration, blood pressure, and pulse oximetry readings in response to their nursing decisions and patient care interventions. **IMPLICATIONS:** Nurse Educators can provide entry-level nursing students with immediate feedback on strengths and areas of improvement. Videotaped clinical simulations can be analyzed to monitor trends in skill proficiency across time and to set performance standards.

Physics and Mathematics Paper Abstracts

STUDY OF A SOLID PHASE TRANSITION USING THE PHASE FIELD MODEL. MARIE T. OUMBA AND M.D. AGGARWAL, DEPARTMENT OF PHYSICS, ALABAMA A&M UNIVERSITY, NORMAL, AL 35762

The phase-field model is used to study the process of phase transition in a material. A phase-field model is a mathematical technique, based in thermodynamics for solving interfacial problems, originated by the mismatch in the lattice parameter during the transition from one phase to another. The phase-field approach substitutes boundary conditions at the interface by a partial differential equation for the evolution of an auxiliary field (the phase field) that takes the role of an order parameter. Phase-field models have experienced a growing interest in crystallization problems. In fact, one of the distinguishing characteristics of the phase-field approach is the good description of the solidification dynamics. In this paper, a phase-field model for phase transition is described. The physical interpretation of the structural order parameter fields is also discussed.

ALTERING RAMAN SPECTROSCOPY VARIABLES USED FOR CHEMICAL DETECTION. A. KASSU, P. GUGGILLA, M. DOKHANIAN, AND SABIHA RUNA, DEPT. OF PHYSICS, ALABAMA A&M UNIVERSITY, NORMAL, AL 35762.

Raman spectroscopy is a method used to detect and identify chemicals by recognizing resonated frequencies emitted from the chemical. Used for the same reason as standard Raman, surface enhanced Raman spectroscopy, or SERS, enhances a chemical's signal detected by up to 10^8 and is used widely for its easy application. Small alterations to the methodical usage of Raman spectroscopy can affect the signal the chemical emits, thus altering the accuracy of correctly recognizing the chemical. Different experiments were conducted, each altering one of the following factors: integration time, chemical distance from laser, Raman cross section, and substrate identity. In addition, cleaning of SERS commercial substrate Klarite® via UV irradiation was observed and changes in chemical detection through Raman spectroscopy were recorded.

DETERMINING LASING THRESHOLDS IN FLUORESCENT MICROSPHERES. DAVID S MACMILLAN III, DAVID B. THOMPSON, AND DAVID A. KEATING, UNIV. OF NORTH ALA., FLORENCE, AL 35632

The luminescence spectrum of a microscopic polystyrene sphere doped with fluorescent dye exhibits resonance peaks at frequencies that are referred to as whispering gallery modes. When excitation light intensity exceeds a certain threshold, stimulated emission occurs at these modes. Measurement of a microsphere's lasing threshold typically uses excitation or detection gated to match the duration of the pulsed laser emission. Here we establish an alternate method for determining the lasing threshold, using continuous excitation and detection. This method relies upon an observation we made; namely, after the lasing pulse, under continuous excitation the resonance population is suppressed.

EFFECTS OF IONIC OXYGEN IRRADIATION ON IR UNCOOLED PIEZOELECTRIC MATERIALS. RYAN MOXON DEPT. OF PHYSICS, ALA A & M UNIV, HUNTSVILLE, AL 35762. ASHOK BATRA, DEPT. OF PHYSICS, ALA A&M UNIV, HUNTSVILLE, AL 35762. MOHAN AGGARWAL, DEPT. OF PHYSICS, ALA A&M UNIV, HUNTSVILLE, AL 35762. PADMAJA GUGGILLA, DEPT. OF PHYSICS, ALA A&M UNIV, HUNTSVILLE, ALA 35762. ARJUN TAN, DEPT. OF PHYSICS, ALA A&M UNIV, HUNTSVILLE, AL 35762. MATTHEW EDWARDS, DEPT. OF PHYSICS, ALA A&M UNIV, HUNTSVILLE, AL 35762

The major problems experienced by some or most of the pyroelectric uncooled infrared (IR) in hostile environment of space, particularly lower earth atmosphere, is the crystalline structure modifications (crystal lattice destruction) of sensor element, when exposed to various kinds of radiations. Thus, their performance is affected. In an effort to investigate in this direction, the effects of oxygen ions irradiations on important pyroelectric infrared sensor materials (three categories such as single crystalline, poly-crystalline, and polymers, fabricated in our laboratory or obtained commercially based on lead zirconate titanate

*modifications, lead meta-niobate, lithium tantalate, lead magnesium niobate-lead titanate, deuterated triglycine sulfate, and poly-vinylidene fluoride on the infrared detector performance parameters and piezoelectric properties as well are being performed in our advanced materials science laboratories. The preliminary results obtained so far will be presented and discussed. *The work is supported by NSF-RISE and Title-III grants.*

INVESTIGATION OF PYROELECTRIC COMPOSITE FILMS FOR USE IN UNCOOLED INFRARED SENSORS. PADMAJA GUGGILLA AND MOSTAFA DOKHANIAN, ALABAMA A&M UNIVERSITY, NORMAL, AL 35762. NASIHA MUNA AND PADMAJA GUGGILLA.

In this investigation, pyroelectric composite films were developed. The films were developed from PZT (lead zirconate titanate) and PVDF (polyvinylidene fluoride). After developing the films, pyroelectric properties were measured using the ferroelectrics polarization system and the pyroelectric coefficient measurement system. The films were coated with silver ions and then placed into a copper chamber that was connected to the measurement systems. Two electrodes, a positive and a negative one were placed on the sample. The temperature was adjusted from approximately room temperature or 22 degrees Celsius to 100 degrees C and the current in amperes was measured. A computer was connected the systems. LabVIEW, MATLAB and Microsoft Excel were used to gather data and construct graphs using the parameters of temperature, current and time. The objective of this experiment was to see how useful pyroelectric films are as infrared sensors. By measuring the pyroelectric coefficient, the relationship between temperature and the pyroelectric coefficient value was measured. The pyroelectric current is proportional to temperature; as the temperature of the samples increased, the pyroelectric coefficient of the samples increased steadily, then remained around a certain value, and decreased gradually.

LASER INDUCED BREAKDOWN SPECTROSCOPY. AKSHAYA KUMAR AND PRAKASH C. SHARMA, DEPARTMENT OF PHYSICS, TUSKEGEE UNIVERSITY, TUSKEGEE, AL 36088.

The concentration of trace elements in solid, liquid and gas samples can be measured in real time and in remote mode using Laser induced breakdown spectroscopy (LIBS) technique. In this technique the laser light is tightly focused on the sample material to create plasma plume. The emission from the hot plasma plume contains the spectral signature of the elements present in the sample. The concentration of trace elements in water sample has been monitored in thin and thick liquid jet mode using LIBS technique. The plasma temperature and plasma density has been calculated.

MOS PROPERTIES OF 4H-SIC CARBON FACE. ZENGJUN CHEN, PRAKASH C. SHARMA, AKSHAYA KUMAR, DEPT. OF PHYSICS, TUSKEGEE UNIV., TUSKEGEE, AL 36088. JOHN R. WILLIAMS, DEPT. OF PHYSICS, AUBURN UNIV., AUBURN, AL 36849.

MOS capacitors and MOSFETs fabricated on carbon-face 4H-SiC are investigated for having a comprehensive view on the material. Hi-lo capacitance-voltage measurements at both 23C° and 300C° are used to obtain the interface trap density (D_{it}). Current-voltage measurements at room temperature are used to collect information of the oxide reliability, i.e. oxide leakage and the breakdown field (E_{bd}). The three-probe I-V system is employed to get I_d - V_g characteristics of the MOSFETs at room temperature, from which the inversion channel mobility is extracted. The results are compared with respect to different post-oxidation annealing methods in the fabrication. The combination of NO and H₂ annealing gives the best D_{it} . Direct growth in NO gas yields the most reliable oxide (E_{bd} =6MV/cm), but still has lower breakdown field than silicon face oxide (D_{it} =8MV/cm). The inversion channel mobility of carbon face SiC depends on epitaxial layer, the highest value we obtain is 35cm²/V.S. Effects such as the presence of mobile ions have been shown to increase low field channel mobility. After negative biased at temperature as high as 250C°, the mobility peak value drops from 65cm²/V.S to 35cm²/V.S. This shows that the effective mobility of carbon face SiC could be no difference from that of silicon face SiC.

SYNERGISTIC EFFECTS OF MULTIWALLED CARBON NANOTUBES AND NIOBIUM OXIDE NANOPARTICLES FOR REVERSIBLE HYDROGEN STORAGE IN NOVEL COMPLEX HYDRIDES. SESHU S. SRINIVASAN, PRAKASH C. SHARMA, DEPARTMENT OF PHYSICS, TUSKEGEE UNIVERSITY, TUSKEGEE, AL 36088, DERSIS E. DEMIROCAK, ELIAS K. STEFANAKOS, D. YOGI GOSWAMI, CLEAN ENERGY RESEARCH CENTER, UNIVERSITY OF SOUTH FLORIDA, TAMPA, FL 33620

The multinary hydride structure consisting of LiBH₄, LiNH₂ and MgH₂ has been shown to reversibly store approximately 6wt.% at 150C° by optimizing the processing conditions of the structure. The hydrogen sorption properties such as kinetics and storage capacity of this multinary structure are significantly improved via the addition of Nb₂O₅ catalyst and multi-wall carbon nanotube (MWCNT). The materials are processed using solid state mechano chemical synthesis techniques and extensively characterized for their thermal, chemical and structural properties using differential scanning calorimetry, thermal gravimetric analysis, x-ray diffraction, scanning electron microscopy, Fourier transform infrared spectroscopy as well as thermal programmed desorption. It is found that the order of addition of Nb₂O₅ and its concentration optimization are essential to fine tuning the hydrogen sorption properties of the multinary hydride. Furthermore, the addition of nano-sized iron was found to greatly enhance the rate of hydrogen release, while the addition of nano-sized nickel is found to have a large effect on reducing the temperature required for hydrogen release. Besides, the addition of MWCNT for the enhancement of hydrogen storage characteristics of Li-nMg-B-N-H due to its high surface area are discussed. The synergistic effects of both Nb₂O₅ nanoparticles and multi-wall carbon nanotubes for the catalytic dissociation of hydrogen atoms and their effective transport mechanism between the complex grains are proposed in this paper. Keywords: Complex Hydrides, Hydrogen Storage, Multi-wall Carbon Nanotube, Nanoparticles, Pressure-Composition-Temperature Isotherm

Physics and Mathematics Poster Abstracts

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SPECIAL INSTRUCTIONS: The only special characters are subscripts for the numbers in EuD₄TEA and ReD₄TEA.

Since the beginning of 21st Century, scientists and engineers have been investigating triboluminescent materials for smart impact sensors. One of the brightest triboluminescent materials found thus far is europium tetrakis dibenzoylmethide triethylammonium (EuD₄TEA). This material was discovered by Hurt in 1966 and is bright enough to be seen in daylight. Innovative design of the material synthesis steps and changing europium chloride to europium nitrate, increases the triboluminescent emission by over 80%. In addition, the material yield increases due to the lack of chloride washing required. Moreover, using the same procedures as the EuD₄TEA, other rare earth tetrakis dibenzoylmethide triethylammonium (ReD₄TEA) have also been synthesized. This poster will discuss the new synthesis process, interesting ReD₄TEA and doping results, triboluminescent testing procedures, triboluminescent results, and future applications of ReD₄TEA phosphors.

DEVELOPMENT OF NANOSTRUCTURED BIOCOMPATIBLE MATERIALS FOR CHEMICAL AND BIOSENSORS. T.KUKHTAREVA*, A.SHARMA, RAQUITTA HOWARD, M.CURLEY, F.OKAFOR, M.DOKHANIAN PHYSICS AND BIOLOGY DEPARTMENTS, ALABAMA A&M UNIVERSITY, NORMAL, AL 35762

The goal of this study is to develop and test the nanostructure composite material film with controlled variation of nanoparticle gaps as substrate and use home –made colloidal silver nanoparticles for Surface Enhancement Raman Scattering (SERS) method for pathogen detection. As sensitivity is high enough to detect a single molecule, SERS offers several engineering advantages including inherent molecular specificity of unlabeled targets, and narrow spectral bands. These unique advantages allow SERS to detect the “fingerprint” of each individual molecule as it represents the vibrational frequencies of functional chemical bonds in molecules, therefore making Raman based chemical and biological sensors optimal. For biosensing applications it is critical to create uniform, highly active and sensitive substrate for pathogen recognition. We embedded in ceramic nano-membrane noble nanoparticle and characterized the substrate using Atom Force Microscopy (AFM), Scanning Electron Microscopy (SEM). We applied nanostructured substrate to measure SERS spectra of 10⁻⁶ Mol/L Rhodamine 6G and E.coli bacteria. Our results showed that silver coated ceramic membrane can serve as appropriate substrate to enhance Raman signal. In addition, we demonstrated that the home-made colloidal silver can work for enhancement Raman spectra for bacteria. We would like to acknowledge Alabama A & M University Interdisciplinary Center for Health Sciences and Health Disparities in the School of Arts and

Sciences with funding provided through the Evans-Allen grant, administered by the School of Agricultural and Environmental Sciences, Title III Program of AAMU, HBCU NSF Grant.

ELECTRICAL AND OPTICAL EFFECTS IN PYROELECTRIC AND PHOTOGALVANIC MATERIALS. EUGENE HARRIS, N.KUKHTAREV, T.KUKHTAREVA, J.C.WANG, A. FIELDS, PHYSICS DEPT, ALABAMA A&M UNIVERSITY, NORMAL, AL 35762

We have studied photogalvanic and pyroelectric properties of ferroelectric crystals LiTaO₃ and LiNbO₃. Our experiments have demonstrated that these materials may have work as compact high electrical power source. Crystal LiNbO₃ being iron doped, exhibits also the photogalvanic effect which gives it the capability to produce electricity from being illuminated by coherent or incoherent light. Both LiTaO₃ and LiNbO₃ are pyroelectric materials which give them a potential of being a source of compact electric power. Pyroelectric crystals create a surface voltage distribution upon undergoing a change in temperature with respect to time. The pyroelectric coefficient of lithium tantalate is $-2.3 \times 10^{-4} \text{C/0Cm}^2$ (Almaz Optics, Inc. , 2009). The pyroelectric coefficient for lithium niobate is $-4 \times 10^{-5} \text{C/0Cm}^2$ (Wong, 2002). As can be seen from the previous information, the pyroelectric coefficient is almost 10 times greater than in LiTaO₃ than LiNbO₃. Photogalvanic crystals in Fe-doped LiNbO₃ in the similar manner may produce high voltage when illuminated by light. We are attempting to use a diode rectifier to condition the voltage signal, so that we may send it to a passive electrical component to store the electrical energy. The rectifier circuit of choose in our testing up to now is a full wave bridge rectifier, which for the classes of commonly used rectifiers is our best choose. In addition, to choosing the proper diode properties for the diodes (bandgap, built in potential, depletion layer width, etc.) We will test this circuit by simulation for the best properties it should have.

ELECTRICAL PROPERTIES OF BINARY SEMICONDUCTORS, JASON M. STEPHENS, ASHOK K. BATRA, AND PADMAJA GUGGILLA, DEPT. OF PHYSICS, UNIVERSITY OF ALABAMA A&M, NORMAL, AL 35762

Polycrystalline binary oxides (SnO₂:WO₃→) bulk sensors were prepared by convectional ceramic processing technology under different conditions. The ac small-signal electrical data were acquired in the frequency (f) range $100 \text{ Hz} \leq f \leq 1 \text{ MHz}$ at a temperature (T) ranging from 31-100°C. The result of calculated parameters: dielectric constant (ϵ''), dielectric loss (ϵ''), real impedance (Z'), and imagery impedance (Z''), and their variation with temperature and frequency are presented and discussed. * Work supported by NSF-RISE grant (0927644).

GALEX SOURCES IN THE DIRECTION OF NGC3680. T. GARBER*, R. M. BLAKE

Multi-wavelength approaches to understanding stellar populations in star clusters enables a greater range of tests for theories of stellar evolution. In this regard, the Galaxy Large Area Explorer (GALEX) satellite has performed a ultraviolet all-sky survey to to facilitate studies of external galaxies and stellar populations in the Milky Way. One key population of the disk of the Galaxy are the old open clusters, which are greater than 1Gyr old and contain the disks

oldest stars. Thus far only one old open clusters has had GALEX sources identified, the canonical cluster M67. We have searched the GALEX data base for other clusters and found a second cluster with GALEX sources, NGC3680. We examine where these stars lie on the cluster color-magnitude diagram and the relation to blue stragglers and binary stars.

GREEN SYNTHESIS OF NOBLE METAL NANOPARTICLES AND THEIR CHARACTERIZATION *RACHEL POWELL, TATIANA KUKHTAREVA, FLORENCE OKAFOR, MOSTAFA DOKHANIAN* ALABAMA A&M UNIVERSITY, PHYSICS AND BIOLOGY DEPARTMENT

Our recent research intentions was focused on development materials, and their characterizations, which can find application in medical research and are responsible for environmental cleaning. We are working on developing an environmentally friendly way to produce nanomaterials using extracellular biosynthesis. In this paper we present the results of producing noble nanoparticles using live plants as reducing agent. In our study we have used Magnolia grandiflora, Geranium, Aloe leaves broth, Actaea racemosa (Black Cohosh), Chrysophyllum albidum (African udala extracts for noble metal nanoparticles production. The reaction process verified with UV-Visible Spectroscopy. We observed the appearance of Surface Plasmon Resonance (SPR) Peak, which corresponded to the silver nanoparticles – 417-430 nm and to the gold nanoparticles – 520-530 nm in several minutes, The nano-silver and nano-gold colloid was characterized by various physical methods including UV-Visible Spectroscopy, Atom Force Microscopy (ATM) and dynamic light scattering technique. However, further investigation, especially high performance liquid chromatography (HPLC), Fourier Transform Infrared Spectroscopy (FTIR) is needed in order to understand the nature of the stabilizing biological molecule after the reaction. Additional investigation using Transmission Electron Microscopy (TEM) is necessary to compare size and shape of nanoparticles for optimization reaction process. This work have been supported by Title III program Alabama A&M University and HBCU grant

GROWTH OF GRAPHENE FILM OVER SIC DURING THE OXIDATION PROCESS. *ZENGJUN CHEN, PRAKASH C. SHARMA, DEPT. OF PHYSICS, TUSKEGEE UNIV., TUSKEGEE, AL 36088.*

Graphene, the thinnest material in the universe with excellent electronic properties, has drawn great attention since it was discovered in 2004. It is necessary to grow high quality graphene film before its being used to build high speed electronic devices. In the present work, an attempt of producing graphene over 4H-Silicon Carbide (SiC) during the thermal oxidation process is proposed. The previous experiment results related to the existing of graphene structures between SiO₂ and SiC are demonstrated. The possible experiment procedures are discussed with respect to growth and detection of graphene.

JERK EXAMPLES IN HORIZONTAL MOTION. *ARJUN TAN AND MATTHEW E. EDWARDS, ALABAMA A & M UNIVERSITY, NORMAL, AL 35762.*

The existence of second acceleration (or jerk) is explored in horizontal motion. Five examples are considered: (1) Horizontal motion with friction only; (2) Horizontal motion with linear air drag only; (3) Horizontal motion with quadratic air drag only; (4) Horizontal motion with friction and linear air drag; and (5) Horizontal motion with friction and quadratic air drag. It is found that frictional force alone does not produce second acceleration but air drag (both linear and quadratic) does. The second acceleration is thus absent in Example 1 only. In the remaining examples, the second acceleration is in the forward direction, i.e., in the direction opposite to that of acceleration. In Examples 2 and 4, the second acceleration diminishes exponentially with time; whereas in Example 3, it diminishes inversely as a cubic function of time. The variation of the second acceleration in Example 5 is a far more complicated function of time.

JERK EXAMPLES IN VERTICAL MOTION. ARJUN TAN AND MATTHEW E. EDWARDS, ALABAMA A & M UNIVERSITY, NORMAL, AL 35762.

The existence of second acceleration (or jerk) is explored in vertical motion under gravity. Five examples are considered: (1) Vertical motion without air drag; (2) Upward motion with linear air drag; (3) Downward motion with linear air drag; (4) Upward motion with quadratic air drag; and (5) Downward motion with quadratic air drag. It is found that gravitational force alone does not produce second acceleration, but air drag (both linear and quadratic) does. The second acceleration is thus absent in Example 1 only. In the remaining examples, the second acceleration is generally in the direction of the velocity and opposite to that of the acceleration. It is thus generally upwards in Examples 2 and 4 and downwards in Examples 3 and 5.

OPTICAL PROPERTIES OF Er^{3+} IONS DOPED IN GLASS. MYRON FLETCHER, AKSHAYA KUMAR, AND PRAKASH C. SHARMA. DEPARTMENT OF PHYSICS, LUTHER FOSTER HALL, TUSKEGEE UNIVERSITY, TUSKEGEE ALABAMA, 36088

Optical properties of Er^{3+} ions doped in glasses and crystals have been studied extensively. Fibers doped with Er^{3+} ions are widely used for amplifications of optical signals in the 1.5 micro-meter wavelength region. The transition involved for amplification is from the higher energy state $^4\text{I}_{13/2}$ back to the ground energy state $^4\text{I}_{15/2}$. Er^{3+} ions doped in glass are also used for optical up conversion. The optical properties are known to change by varying the glass composition. The various optical parameters such as the lifetime of the excited states and bandwidth of emission would be compared for the Er^{3+} ions in different glass host.

OPTICAL PROPERTIES OF Nd^{3+} IONS DOPED IN GLASS. BRIA MOORE, AKSHAYA KUMAR, PRAKASH C. SHARMA, TUSKEGEE UNIVERSITY, TUSKEGEE, ALABAMA 36088.

Glasses have some unique advantages over crystals one being that glass is relatively easy to make in bulk and easier to tailor to a specific rare earth ion concentration. Glasses also have an amorphous structure giving them another advantage over crystalline structures in laser

applications. The structure relates to the glass property of inhomogeneous broadening which allows coupling of more pump energy from the flash lamps and thus a more efficient laser. Nd³⁺ ions are especially known for producing laser light at 1064 nm while doped in a crystal or glass host due to a transition from the upper energy state 4F_{3/2} to a lower energy state 4I_{11/2}. It is observed that there is a strong correlation between the structure and composition of the host glass and the optical properties shown. The present attempt is to compare the optical properties of Nd³⁺ ions doped in different glass hosts.

SEARCH FOR OPTICAL COUNTERPARTS TO ROTATING RADIO ASTRONOMICAL TRANSIENTS. R.M. BLAKE, DEPT. OF PHYSICS AND EARTH SCIENCE, UNIV. OF NORTH ALA., FLORENCE, AL 35630. DANIEL ISAAC JOHNSON AND TERRY TIDWELL, UNIV. OF NORTH ALA., FLORENCE, AL 35630.

RRAT's were discovered in 2006 via data mining of the Parkes survey for transient objects. These objects are believed to be unconventional types of pulsars which have been observed to be remarkably luminous in radio wavelengths during outburst. Using the 0.4m automated PROMPT telescopes at Cerro Tololo, Chile, we made a preliminary attempt to identify these outbursts in visual wavelengths: specifically V,R, and I. We selected three RRAT's, J144360, J13175759, and J084843, for observation. Our results produced numerous candidate variable stars; however, no visual outbursts analogous to radio outbursts were observed for our three RRAT's.

STUDIES ON NANO-STRUCTURED BINARY SEMICONDUCTORS FOR CHEMICAL SENSORS, JASON M. STEPHENS, JAMES R. CURRIE, AND ASHOK K. BATRA, DEPT. OF PHYSICS, UNIVERSITY OF ALABAMA A&M, NORMAL, AL 35762

Semiconductor gas sensors based on SnO₂ have been widely used as a convenient tool for detecting inflammable and toxic gases. In the present investigation, binary composites: SnO₂:WO₃ bulk polycrystalline samples were fabricated using nano-particles in order to enhance the sensitivity for organic volatile vapors detection. The binary sensors were tested for their performance in the detection of organic volatile compound (VOCs). In this poster, the preliminary results of our research on binary composite sensors are presented. * Work supported by NSF-RISE grant (0927644).

SYNERGISTIC EFFECTS OF ZN-DOPING AND HIGH ENERGY BALL MILLING ON THE TiO₂ PHOTOCATALYTIC NANOPARTICLES. BRIA MOORE, SESA SRINIVASAN, P.C. SHARMA, DEPARTMENT OF PHYSICS, COLLEGE OF ENGINEERING AND PHYSICAL SCIENCES, TUSKEGEE UNIVERSITY, TUSKEGEE, AL 36088.

This paper aims to improve the photocatalytic performances of Zinc doped TiO_2 nanoparticles by high energy mechanical milling. The kinetic analyses revealed that the photocatalytic activity of Zn doped TiO_2 was improved two times due to the increase of the surface area and the decrease in average crystallite size at the same time after employing the high energy ball milling. Kubelka-Munk spectra of pristine and ball milled samples demonstrated a blue shift from 3.2 eV to 3.35 eV, which may be because of the quantum size effects. SEM microstructural investigations revealed variations in the surface morphology with different Zn doping concentrations in the TiO_2 -Xwt.% Zn nanoparticles. EDS spectra of these samples confirmed the optimization of stoichiometric concentration of Zn. Other characterization including X-ray diffraction (XRD), BET surface and the photocatalytic decomposition were also studied and the results are discussed in this presentation. Keywords: TiO_2 Nanoparticles, Photocatalysis, Zinc doping, Sol-gel, Characterization, High Energy Ball Milling

THE JERK VECTOR IN PROJECTILE MOTION WITH AIR DRAG. ARJUN TAN AND MATTHEW E. EDWARDS, ALABAMA A & M UNIVERSITY, NORMAL, AL 35762

The existence of the jerk vector (or second acceleration) is explored in projectile motion under gravity. Three examples are considered: (1) Projectile motion under gravity without air drag; (2) Projectile motion under gravity with linear air drag; and (3) Projectile motion under gravity with quadratic air drag. It is found that the jerk vector is zero in the absence of air drag (Example 1) but non-zero when air drag is present (Examples 2 and 3). The exact solution for the jerk vector is obtained in Example 2 only. The jerk vector maintains a constant direction (upwards and forwards), its magnitude being attenuated exponentially in time by a drag factor. In Example 3, exact solution of the jerk vector can only be obtained in intrinsic coordinates (viz., the slope angle). However, the position of the projectile still has to be calculated by numerical integration.

Science Education Paper Abstracts

ASTROBIOLOGY CONCEPTS INTEGRATED ACROSS THE LIFE SCIENCES CURRICULUM. ROGER A. SAUTERER, DEPT OF BIOLOGY, JACKSONVILLE STATE UNIV, JACKSONVILLE, AL 36265

Astrobiology is a highly interdisciplinary field that examines the fundamental parameters of life, the interaction of the planetary environment with the biosphere, the origin of life, and the possibility of life elsewhere in the universe. Because astrobiology integrates data from astronomy, the geosciences, chemistry and the life sciences, the use of concepts of astrobiology in the classroom can give students a holistic outlook and appreciation for the interactions between astronomical events, planetary evolution and the biosphere that is frequently ignored in typical biology courses. Astrobiology concepts can be integrated into introductory biology courses, microbiology, and cell/molecular biology courses. Examples of important astrobiology concepts include the causes of mass extinctions and their effect on the evolution of life, the effects of methanogenic metabolism and oxygenic photosynthesis on the global environment and evolution of life, non-photosynthetic ecosystems such as

hydrothermal vent and subsurface ecosystems, extremophile biology and “alternate” metabolic strategies such as sulfur or metal oxidation. The possibility that life similar to current methanogens and extremophiles may have existed or still exist on Mars and in the subsurface ocean of Europa can be discussed. Additionally, discussions on what are the most fundamental properties of life and strategies for its detection can be used to stimulate classroom discussion and student essays. Use of these and other concepts require relatively little classroom time but can increase student understanding and appreciation of the fundamental aspects of life, evolution and the interactions between the planet and the biosphere.

IN STEP WITH EVOLUTION: A CLASSROOM ACTIVITY ON DNA ALIGNMENT AND PHYLOGENY RECONSTRUCTION. *JIMMY K. TRIPLETT*, DEPT. OF BIOLOGY, JACKSONVILLE STATE UNIVERSITY, JACKSONVILLE, AL 36265.

In biology classes that encompass biodiversity, students are often presented with cladograms (phylogenetic trees) that represent evolutionary relationships through tree-like diagrams. Modern methods of generating these diagrams typically include DNA evidence, while interpretation is based on the principle of monophyly. Methods of building and interpreting phylogenetic trees are often overlooked as difficult or time-consuming topics, yet without this background students often fail to understand cladograms or grasp the significance of modern classification systems based on evolution. “In Step with Evolution” is an interactive classroom activity designed to help teachers explain phylogenetic methods using DNA sequence data. The activity is designed for small groups (10-30 students) and teaches tree-building according to the principles of cladistics (using shared, derived characters to define monophyletic groups). Each student receives DNA sequence data in the form of a set of **cards**, with each card representing a nucleotide and each set representing a different species. Working as a group, students build a DNA alignment and discover the underlying phylogeny of the species. In the process, students discuss DNA analysis and modern methods of assembling the “tree of life.” In this presentation, the exercise will be discussed along with modifications for different classes and grade levels.

NATURAL HISTORY EDUCATION FOR ADULTS: DEVELOPMENT OF A COMPREHENSIVE CURRICULUM FOR CENTRAL ALABAMA. *ELLEN W. MCLAUGHLIN*, DEPT. OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES, SAMFORD UNIV., BIRMINGHAM, AL 35229.

In Alabama, there are many excellent nature programs for children but, other than Master Gardener certification, almost no comprehensive reward programs were available for adults who worked, were retired or homeschooled. Many states have Master Naturalist programs but in 2009 no such program existed in the Birmingham area. Therefore, a natural history curriculum was developed for adults with the cooperation of Samford After Sundown and The Department of Biology. Our premise was that those people who begin to appreciate and enjoy the beauty and diversity of the local flora and fauna, will become more active in conservation efforts. Ten courses were developed covering the spectrum of nature that an individual might encounter in day to day living-- from backyards and roadsides, to nearby woods and streams and from soil and rocks to sky. Courses include Tree Identification and

Tree Bark Biota, The Forest Floor, Wildflowers, Birding, Fishes and Aquatic Biology, Insects and Spiders, Vertebrates, Geology, Astronomy and Wildlife Photography. Biology-based courses meet for six hours on Saturday and include a laboratory microscope experience and field trips. Awards are given to encourage continued participation. After four courses, participants receive a Legacy poster of Alabama wildlife. After seven courses and a Citizen Science project, a Certificate of Achievement, another Legacy poster and a Field Guide are awarded. Samford After Sundown handles the advertising and registration. Cost is \$60.00 per course and average enrollment is 10.

Science Education Poster Abstracts

ENGAGING THE STUDENT: THE USE OF MODELING AND TECHNOLOGY IN THE SCIENCE CLASSROOM. WARREN T. JONES, GYPSY A. ABBOTT, STEPHEN A. WATTS, THE UNIVERSITY OF ALABAMA AT BIRMINGHAM, BIRMINGHAM, AL, 35294.

With each successive generation of students, the expectation of implemented technology in the classroom increases both in scope and complexity. There are several effective means to engage students using computer modeling and online learning. Often instructors are limited by individual instruction; whereas, the implementation of distance and online resources allows differential instruction and incorporation of more advanced learning modules. As an example of available resources, several institutions and universities offer their entire educational programs as OER. Over the past 8 years, we have used a wide spectrum of educational resources to engage students, the most effective involving a combination of visualization and online resources. These techniques have been implemented at the K-12 level through the NSF GK-12 program, student and teacher workshops such as EdGrid, as well as at the undergraduate level in the biology laboratory. Some of the results of these techniques have been increased attention and motivation in the classroom, more broad understanding of the concepts, as well as improved student writing. We believe that a combination of these resources in the classroom is integral for engagement of both K-12 science students as well as STEM majors, as our current and future students' expectations will continue to increase.

INTEGRATED LEARNING: TROY UNIVERSITY COMMON READING INITIATIVE AND PRINCIPLES OF BIOLOGY. MICHAEL WAYNE MORRIS, NEIL BILLINGTON, JAMIE BURCHILL, JONATHAN CATRETT, ELIZABETH ENSOR, JANET GASTON, AND CHRISTI MAGRATH, DEPT. OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES, TROY UNIV., TROY, AL 36082.

During the Fall Semester, 2007, the Troy Campus of Troy University began a First-Year Reading Initiative to foster integrated learning among entering freshmen. This endeavor has evolved into the Troy University Common Reading Initiative and takes into account that undergraduate students of any classification enroll in general studies courses frequently referred to as "freshman" or "first-year" courses. Students registered for subjects as varied as English, biology, psychology, and university orientation are assigned a common reader; and each class approaches the common reader from the perspective of the subject taught in that

class. Students learn that integration of knowledge, not the separation of different subjects, is vital to have successful college and life experiences. During the Fall Semester, 2009, and the Spring Semester, 2010, *Ecology of a Cracker Childhood*, by award-winning author Janisse Ray, was chosen as the common reader. In her book, Ray alternates chapters about her own life story in rural south Georgia with chapters focusing on the biology of the Longleaf Pine Forest Ecosystem. *Ecology of a Cracker Childhood* helped enhance discussions on natural communities incorporated in the Principles of Biology class. The book reinforced the importance of controlled burns, keystone species, and adaptations to harsh conditions, among other concepts. Experiences of biology faculty and students using this common reader will be presented.

Gorgas Competition Paper Abstracts



ENVIRONMENTAL FACTORS AND RATE OF BACTERIAL GROWTH. RODAH M. WANGONDU*. MURPHY HIGH SCHOOL. MOBILE, AL. 36606.

Environmental factors and rate of bacterial growth. Rodah M. Wangondu*. Murphy High School. Mobile, AL. 36606. There are numerous factors that affect the growth of bacteria such as temperature, light, oxygen, moisture, pH, and access to nutrients. This experiment was designed to answer the question of how the rate of bacterial growth of *Enterobacter aerogenes*, *Pseudomonas fluorescens*, *Staphylococcus aureus*, and *Bacillus megatarium* is related to the environmental factors of pH, temperature, moisture, and nutrient availability. To answer this question, 12 environments were designed based on the different combinations of the four environmental factors: pH, temperature, moisture, and nutrient availability. These environments were designed on the basis of the three cardinal points for bacterial growth: minimum, optimum, and maximum. The cardinal values for pH were 1.32, 7.08, 10.06 while the cardinal values for temperature were 5°C, 33°C, and 55°C. The cardinal values for moisture were based on increase in salt concentration and were therefore 0%, 2.5%, and 7.5%. The cardinal values for nutrient availability were based on glucose concentration and thus were .1 mM, 5 mM, and 10 mM. The control group was the bacteria grown in the environment in which all the environmental factors were optimum for the specific bacteria's growth. This was evident in the broth with a pH of 7.08, 5 mM glucose concentration, and 0% NaCl added while grown at 33°C. The hypothesis was that the greatest bacterial growth would be experienced at this control environment as all the bacteria are neutrophilic, mesophilic and psychrotrophic. The hypothesis was proven correct for the pH and moisture experiments but incorrect for the temperature and nutrient experiments.

JAMES CAUSEY JSU ARL

Since 2004, the Jacksonville State University Archaeological Resource Laboratory has been conducting Phase I Cultural Resource Surveys within the boundaries of the Talladega National Forest as part of a Cost Sharing Agreement with the U.S. Forest Service. As a result of these pedestrian surveys of selected areas, numerous cultural resources have been located and initially investigated. This paper will briefly discuss history of this project, survey procedures and results. In addition, three cultural resources, a stone structures site (1Cb107?), Pinkey Burns Cabin site(1 Cb???) and a recently discovered gold mining site (????) will be described in more detail.

THE ART OF PHOTOGRAPHING ARCHAEOLOGICAL ARTIFACTS FOR TECHNICAL REPORTS SEAN WILLIAMON JSU ARL

The Art of Photographing Archaeological Artifacts for Technical Reports The JSU-ARL conducts numerous cultural resource management projects which require technical reports. An important portion of these reports is an accurate documentation of the artifacts recovered during these investigations. This paper will briefly discuss the advantages of point-and-shoot versus a digital **single** lens reflex (SLR) camera, and the problems inherent in photographing archaeological material within a laboratory setting, including scanned versus photographed material. The importance of calibrating your computer monitor and the techniques for producing high-quality digital photographs of various archaeological artifacts will be discussed. The difficulty of recording the details on artifacts such as glass, and the software used to produce the highest resolution digital photographs also will be addressed.

Gorgas Competition Poster Abstracts

BURNING PROFICIENCY OF COOKING OILS FOR ALTERNATIVE FUEL USE. *BEN MCCORMICK

Gasoline, which has not been as abundant as it has in the past in Saudi Arabia (our main source), has steadily increased in price and has become unaffordable for many Americans. What substances could be used in the future to power transportation vehicles? Which substance would be the most productive and least hazardous in powering the cars? This is important to society because people have to get from place to place, and gas prices are preventing them from doing this. Gas prices are near the highest they have ever been, and people cannot afford to pay this fee for transportation. Alternative fuels would provide a source for people to transport at cheaper costs. A Peanut/Corn Oil Mixture would be a great source because it has a low flash point, low emissions, and a lower cost than pure Peanut Oil; however, Used Peanut Oil with Animal Fat would be the best source for primary fuel because it has had the lowest flash point and least emissions in past experimentation. The experiment was to test different types of cooking oils/mixtures to test which one has the highest burning proficiency. The different types of oil were placed in cans and heated in constant temperature intervals. They were lit, and information was recorded on flash point and emissions (CO, CO₂, O₂, and HC), and energy production. Olive oil has a flash point and is the cleanest, but the flame dies when the oil is taken from the heat source. Used Peanut Oil with Animal Fat in the B75 form has the lowest flash point and the lowest amount of emissions of the oils tested, as well as the most energy produced.

HIDDEN SOUNDS: HARMONIC SYMMETRY OF HUMAN VOICES, YEAR 2. ELLEN M. PRICE, JEFFERSON COUNTY INTERNATIONAL BACCALAUREATE SCHOOL, BIRMINGHAM, AL 35210.

Many people rely on voice synthesis technology to communicate and learn. This experiment investigated the harmonic ratios of human voices that could potentially improve voice synthesis technology. Ten volunteers were asked to read a script slowly and clearly into a

microphone while the audio was recorded. Each voice sample was broken into twenty single sounds and analyzed using a Fast Fourier Transform (FFT). Harmonic profiles for each of the two hundred recordings were generated and compared with an analysis of variance (ANOVA). The ANOVA supported the hypothesis that the harmonic distributions were equal. Next, a similar procedure was used to evaluate the difference in harmonic ratios of the human voice and a synthesized voice. Synthesized voice samples were evaluated with the FFT and compared to the natural voice samples with a χ^2 goodness-of-fit test. Individually, the harmonic distributions were different, but the average distributions were the same. Finally, voice samples were collected through a cellular phone system to determine the difference between the harmonic distributions of the natural voice and the electronically processed voice. The FFT and χ^2 goodness-of-fit test were employed again in the analysis, and, as in the second experiment, the harmonic distributions of the individual sounds were found to be different, but the mean distributions were equal. These results suggest, therefore, that human voices do share a common harmonic distribution, and it is unclear whether the synthesized voice or cellular phone significantly changed that distribution.

RELATIONSHIP BETWEEN SWEETPOTATO (IPOMOEA BATATAS L.LAM) STORAGE ROOT YIELD, INSECT-PESTS AND STORABILITY. SHAMBHU P KATEL*,ALABAMA A&M UNIVERSITY, NORMAL, AL 35762; SRINIVASA R MENTREDDY,ALABAMA A&M UNIVERSITY; DAVID M JACKSON,USDA ARS VEGETABLES RESEARCH LAB, SOUTH CHARLESTON;PADMA NIMMAKAYALA,WEST VIRGINIA STATE UNIVERSITY UMESH REDDY,WEST VIRGINIA STATE UNIVERSITY

Phenotypic characteristics of 94 genotypes of sweetpotato were assessed in 2007 and of 62 selected genotypes in 2008 and 2009 in the segregating F1 population from a cross between Excel and SC 1149-19 for the purpose of identifying genotypes for better insect-pest tolerance and root yields. In 2007 and 2008, stem cuttings from plants in the greenhouse which were raised from tissue culture plantlets obtained from USDA ARS Vegetable Research Station, Charleston, SC were transplanted onto raised beds at the Auburn University Horticultural Research Center, Cullman, AL (in 2009, the experiment was conducted at Charleston, SC). In 2007, each genotype was planted in single-row plots for initial screening whereas randomized complete block design was used with three replications in 2008 and 2009. Data on plant morphological traits were recorded in the field. At harvest, storage root fresh yield was recorded and storage roots were graded as per USDA charts. They were also scored for insect damages and other root qualities. There were significant genotypic variations for several phenotypic traits such as fresh storage root yield, several root characteristics, storability and root insect-pest tolerance. Some correlations were also found between these traits.

THE EFFECT OF HEAVY METALS ON THE FOOD CHAIN. ARINA GHOSH, ALABAMA SCHOOL OF FINE ARTS, BIRMINGHAM, ALABAMA, 35203.

Across the nation, there are areas where toxic waste is being dumped into landfills near communities. The purpose of this study was to see if heavy metals can be taken up into the roots of plants, and affect the entire food chain. The health concern studied was the effect of

heavy metals on porphyrin ring compounds. In this study, basil and pepper plants were grown and watered with 0.025M $\text{Hg}(\text{NO}_3)_2$, $\text{Pb}(\text{NO}_3)_2$, or H_2O . The entire plant was ground up, filtered, and added to a NaCl solution to check for a precipitate. Precipitates resulted in all of the plants treated with heavy metal solutions whereas none appeared in the control. The second part of this study focused on the effect of heavy metals on porphyrin ring compounds. In a well plate, 5 drops of catalase (a porphyrin similar to heme), 5 drops of H_2O_2 and 1 drop of $\text{Hg}(\text{NO}_3)_2$, $\text{Pb}(\text{NO}_3)_2$, or H_2O were added to a well. Then the rate at which a filter paper disk rose in each well was calculated. On average, the rate was 7.4% slower in the presence of $\text{Pb}(\text{NO}_3)_2$ and 85.2% slower in the presence of $\text{Hg}(\text{NO}_3)_2$. This data indicates that heavy metals disrupt porphyrin ring activity. It was concluded that plants can absorb heavy metals into their roots, affecting the entire food chain. Populations living near landfills can be exposed to heavy metals while eating chemically saturated autotrophs; later they may face serious health complications because the inefficiency of oxygen transportation.

THE EFFECTS OF ANTIOXIDANTS ON *LACTOBACILLUS CASEI*. MARY WILLS, JEFFERSON COUNTY INTERNATIONAL BACCALAUREATE SCHOOL, IRONDALE, AL 35210-4278

SPECIAL INSTRUCTIONS: *Lactobacillus casei* should be italicized every time used.

Both antioxidants and *Lactobacillus casei* help the body in many different ways. From stabilizing oxidation reduction reactions to inhibiting pathogens, both protect the body from harmful substances. Determining antioxidant levels and effects can be difficult; however, a possible correlation between antioxidants and *Lactobacillus casei* has been found (Kapila). The extent to which antioxidant levels affect *Lactobacillus casei* growth, if they do at all, has yet to be proven and will be explored in this experiment. The question remains: do antioxidants increase *Lactobacillus casei* growth? If antioxidant-rich red wine, chocolate, green tea, vitamin C, blueberries, cranberries, and blackberries are added to *Lactobacillus casei*, then the bacteria colonies will increase. Keeping this hypothesis in mind throughout the experiment, antioxidant solutions were made, incubated with *Lactobacillus casei*, and then inoculated in blood agar plates. In order to determine whether or not the antioxidants affected colony growth, the average colony sizes and number of colonies present for each group was then analyzed. The control group had the lowest total growth when considering the average colony size and average colonies present. The other groups had greater growth in either average colony size or average colonies present or both criteria. The evidence supports the positive correlation between antioxidants and *Lactobacillus casei* growth. The antioxidants in the green tea, chocolate, vitamin C, red wine, cranberries, blueberries, and blackberries interacted with the *Lactobacillus casei* causing increased colony growth. Consequently, *Lactobacillus casei* can indeed be naturally increased by ingesting antioxidant rich substances.

AGENDA
ALABAMA ACADEMY OF SCIENCE
SPRING 2011 EXECUTIVE COMMITTEE MEETING
JACKSONVILLE STATE UNIVERSITY
WEDNESDAY, March 2, 2011, 6:00 PM, Martin Hall, Room 111

A. Call to order and approval of minutes of the Fall 2010 Executive Committee Meeting [Minutes on the [Academy website](#)]

B. Officer Reports..... 3

1. Board of Trustees Ken Marion
2. President Brian Burnes
3. President -Elect Mickie Powell
4. Second Vice President Ronald Hunsinger
5. Secretary Janie Gregg
6. Treasurer Bettina Riley
7. Journal Editor Safaa Al-Hamdani
8. Counselor to AJAS Catherine Shields
9. Science Fair Coordinator Virginia Valardi
10. Science Olympiad Coordinator Jane Nall
11. Counselor to AAAS Steve Watts
12. Section Officers

I. Biological Sciences	Megan Gibbons
II. Chemistry	Emanuel Waddell
III. Physics & Mathematics	Manmohan Aggarwal
IV. Engineering & Computer Science	David Thornton
V. Social Sciences	Richard Hudiburg
VI. Anthropology	Harry Holstein
VII. Science Education	Janet Gaston
VIII. Industry, Environmental, and Earth Science	Janie Gregg
IX. Health Sciences J. Michael Martin	
X. Bioethics & History/Philosophy of Science	Gerry Elfstrom

13. Executive Officer Larry Krannich

C. Committee Reports..... 22

- | | |
|------------------------|--|
| 1. Local Arrangements | George Cline, James Rayburn,
Mark Meade |
| 2. Finance | Ken Marion |
| 3. Membership | Vacant |
| 4. Research | George Cline |
| 5. Long-Range Planning | Adrian Ludwick |

6. Auditing, Senior Academy
7. Auditing, Junior Academy
8. Editorial Board & Associate Journal Editors
9. Place and Date of Meeting
10. Public Relations
11. Archives
12. Science and Public Policy
13. Gardner Award and AAS Fellows
14. Carmichael Award
15. Resolutions
16. Nominating Committee
17. Mason Scholarship
18. Gorgas Scholarship Program
19. Electronic Media

Robert Angus
 Catherine Shields
 Thane Wibbels
 Jimmy Triplett
 Roland Dute
 Troy Best
 Scott Brande
 Prakash Sharma
 Richard Hudiburg
 Vacant
 Ron Hunsinger
 Mike Moeller
 Ellen Buckner
 Brian Toone

D. Old Business..... 33

E. New Business..... 33

F. Adjournment
 33

The officer and committee reports were reviewed and some discussed occurred relative to some of the reports:

President’s Report: We are looking at putting the journal online. The intent is to have people subscribe on an annual basis or purchase individual articles. EBSCO has MetaPress e-journals, a turnkey journal that would cost us \$5,400 for the first year to setup everything with maintenance of subscriber/membership lists. Based on the last five years, the editor questioned whether we need to send it to the company. This would be seamless with our website. There would be a direct link to their website and they would handle everything. Not sure about the value of it... Need to look at the costs to see if it does provide us value. Also, Brian Toone stated that he could give us a proposal for doing the electronic journal and keeping it on our website. George Cline made a motion that we do an online journal and pay Brian Toone to do this. Brian Burns made a motion that we go electronic with the journal. Safaa seconded the motion and the voted approved going electronic. Janie Gregg suggested that a cd be given to people who wanted a “hard” copy. The editor said he could get Kinkos or JSU printshop to print journals to send to libraries. A motion was made, seconded, and voted on to have Brian Toone receive journal content from the editor and compile our first e-journal to put online, Ken Marion made a motion to give the steering committee the power to analyze Brian Toone’s proposal of the complete list of costs associated with online journal and hard copies printed at JSU. George Cline second and motion carried.

Second vice-president report: Ronald Hunsinger gave the report and announced the nominees for officers and individuals for committee appointments. This list was approved. He also

recommended that James Rayburn be added as a committee member to the Date and Place committee. This was seconded and approved.

Finance Committee Report: Ken Marion gave the report and stated that an audit was being done and after that is completed, a budget will be created for next year.

Counselor to Alabama Junior Academy: Catherine Shields reported that she agreed to fill the position on an interim bases after Henry resigned. Paperwork had not been filed last year and we did not receive funding for this year. She contacted the national office and Doris Cousins confirmed this. Therefore, we need to raise probably \$8,000 to send kids to nationals. National meeting is in San Diego and Doris will allow our five top students to attend; but we will have to pay the costs. She is looking for sources of funding. After considerable discussion, a motion was made to ask AAS membership to give a tax deductible donation to assist with the funding and form a task forces to develop a plan for long range stability of this Junior Academy program. Task force was comprised of George Cline, Catherine Shields, Ellen Buckner, Bettina Riley, and Mickie Powell).

Local Arrangements report: George Cline gave the report and stated that, there were 93 pre-registrants and about 180 attendees are expected. Senator Shelby is sending someone from his office for the gulf oil symposium.

Research Committee: 35 applications were received for travel grants and have approved 30 at \$40 and 5 at \$30. There is a total of \$3,150 traditionally available for travel and research funds.

Long Range Planning Committee: Adrienne Ludwick stated that the committee needs to establish a clear plan for the Academy. Facebook was mentioned as a good recruiting tool and is being used elsewhere to recruit. Brian Toone said he would create a facebook page for us.

Gardner Award: Gardner award has been awarded to J. Michael Wyss who is the director of the Center for Community Outreach Development (CORD) at UAB. He won't be in attendance this year to receive the award and it will be given to him at next year's banquet.

Gorgas Scholarship: Auburn increased its scholarship award to this year. The winner gets a 4-year award... finalists gets some scholarship after looking at SAT or ACT.

Media report: The PayPal balance is approximately \$3,000. Some updating of the website is needed to reflect current officers.

A

1. Call to Order

2. Review/approval of minutes of the Fall 2010 Executive Committee Meeting See Alabama Academy of Science website for a copy of the minutes

B. Officer Reports

B-1

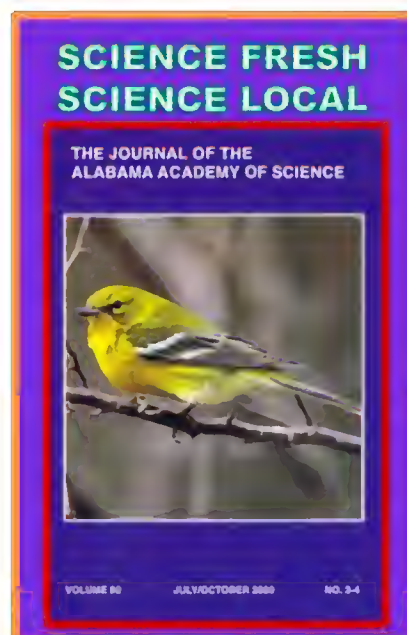
Board of Trustees Report

None Submitted

President's Report

The following are some issues that we have been working on this year:

- 1) *How to promote the JAAS? This will be addressed in e-journal issues (below).*



- 2) *Poster/pamphlet? This will be tackled after e-journal issues are resolved.*

3) *Feasibility of indexing the JAAS in Medline/PubMed?* There is an instruction page at http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=helppubmed&part=publisherhelp#publisherhelp.Data_Provider_Quick_. Basically, we need to supply and submit XML tagged citations and abstracts that can be linked to pdf files which will be kept on the AAS server.

- a) This will be done by an e-journal provider (see below).

4) How to generate the .pdf files? Pambanisha King, Document Delivery Head, Auburn University will send the JAAS in batches to UWA for scanning into .pdf files.

- a) I have scanned 2002-2007 (2007+ is already on AAS webpage).
- b) Discovered that Gale-Cengage has the last 10 years of content available online for a fee, but content is not indexed in PubMed or Google Scholar.
- c) Gale-Cengage has no e-journal capacity; was referred to Atypon...awaiting return call.
- d) EBSCO has MetaPress e-journal capacity; a proposal from MetaPress is available and will be discussed:

MetaPress estimates the charges to the *Alabama Academy of Science* are, assuming receipt of PDFs of article and reviews, and based upon our completed technical review of a production sample:

	Implementation Period	First Year	Second Year	Third Year
Initial Development	\$4,500			
Content Loading	\$900	\$825	\$825	\$825
Hosting		\$300	\$300	\$300
Software Maintenance		\$240	\$240	\$240
Total	\$5,400	\$1,365	\$1,365	\$1,365

Complete proposal will be available in hardcopy at the meeting.
Respectfully submitted,
Brian Burnes, President

B-3

Report of the President-Elect

Non Submitted.

B-4

Second Vice President Report

Please refer to the Nominating Committee Report (C16).
Respectfully submitted
Ronald Hunsinger
Second Vice-President

B-5

Secretary Report

All the secretarial files have been received. Email dues notices have been sent to all current members, AAS officers, AAS committee members, and annual meeting presenters.

B-6

Treasurer's Report

Table 1

ALABAMA ACADEMY OF SCIENCE FUNDS BALANCE

Account Balance as of 2/22/2010

Checking	\$5,512.25
Savings	\$1,263.13
CD1	\$10,545.27
CD2	\$7,543.10
TOTAL	\$24,863.75

Table 2

ISEF FUNDS Summary 2005 through 2010

Year	Yearly Balance	ISEF Account Balance Running Total
2005	\$ (2,369.92)	\$ (2,369.92)
2006	\$ (2,413.50)	\$ (4,783.42)
2007	\$ (1,889.60)	\$ (6,673.02)
2008	\$ (12.22)	\$ (6,685.24)
2009	\$ 4,044.00	\$ (2,641.24)
2010	\$ 4,631.29	\$ 1,990.05

The Table 1 indicates the total balances in all the Academy accounts as of 2/22/2011 when this report was generated. The second table indicates the yearly and running total balances of the ISEF Funds that are reflected each year in the total balances in the Academy accounts. On the next two pages are comparisons of income and expenses for two periods: (1) from the fall to the

spring Executive Committee meetings and (2) from the annual meeting to annual meeting time frame to indicate the flow of income and expenses. These financial data do not reflect current Gorgas Account funds. The Academy accounts are currently undergoing an extensive audit.

Respectfully submitted,
Bettina Riley, Treasurer
Year Yearly Balance

B-7

Journal Editor Report

No report submitted.

B-8

Counselor to Alabama Junior Academy of Science Report Work to expand the Alabama Junior Academy of Science (AJAS) Paper Reading and Gorgas competitions continues through the work of Dr. Mark Jones, AJAS Fellow. Three regions have registered presenters for the state competition: Central, South Central, and Southeast. Ten students from the Central region, seven students from the South Central region and one from the Southeast region will present at the state competition. Although the Northwest region has been active for many years, Vicki Farina is unable to attend this year and has been unable to recruit another teacher to sponsor student papers. We are working to encourage this region to continue their tradition of participation.

Dr. Henry Barwood resigned from his position as State Counselor. Dr. Catherine Shields agreed to serve as the interim State Counselor. Dr. Barwood is in the process of completing paperwork to enable Dr. Shields to access funds to pay the bills associated with the program. Dr. Barwood and Dr. B. J. Bateman are working with Dr. Shields to transfer information and resources to enable a smooth transition. Plans are underway for the State Paper Reading competition in Jacksonville, AL March 3-4, 2011. The national Junior Sciences and Humanities Symposium (JSHS) will take place April 27 – May 1, 2011 in San Diego, California. The five first place winners from the State competition will attend JSHS and first and second place winners will present their research at the national meeting.

For many years the state competition categories (biology, physical science, humanities, engineering, and math) have been different from the national categories (environmental science, engineering, physical science, chemistry, life science, medicine and health, math and computer science). At the State meeting, AJAS would like for the state categories to be amended to match the national categories. One problem with this change is that the national JSHS office pays for students to attend the national meeting and this would increase the number of students eligible to attend from five to seven students. It is not clear how this change will affect the funds available to send students to JSHS. Although attempts have been made to contact the national office, emails sent to the addresses at the JSHS site have been returned as undeliverable.

Work will continue to focus on increasing participation in the AJAS program. Dr. Mark Jones will place fliers advertising the program in the packets for all students at the state science fair and will attempt to contact coordinators of regional science fairs state-wide to place fliers in student packets. All AAS Board members are encouraged to share information about AJAS scholarship opportunities with people in your academic and personal communities state-wide. Respectfully submitted, Catherine Shields, Interim Director

Science Fair Coordinator Report

No report submitted. The following is a listing of the 2011 Science Fairs:

2011 REGIONAL SCIENCE FAIRS

North Alabama Regional Science & Engineering Fair, The University of Alabama in Huntsville, March 2-4, 2011, Barbara Lucius, barbaral@eng.uah.edu.

Central Alabama Regional Science & Engineering Fair, The University of Alabama at Birmingham, March 5, 2011, Kevin Jarrett, Kjarrett@uab.edu.

West Alabama Regional Science & Engineering Fair, The University of West Alabama, March 11-12, 2011, John McCall, jmccall@uwa.edu.

Greater East Alabama Regional Science & Engineering Fair, Auburn University, March 9, 2011, Mary Lou Ewald, ewaldml@auburn.edu.

South Alabama Regional Science & Engineering Fair, The University of South Alabama, March 25-26, 2011, Jim Connors, jconnors@usouthal.edu.

2011 ALABAMA STATE SCIENCE AND ENGINEERING FAIR

April 1 – 3, The University of Alabama in Huntsville; Coordinator, John D Fix, College of Science, University of Alabama in Huntsville, 301 Sparkman Dr., Huntsville, 35899
Alabama Science and Engineering Fair web site: <http://nsstc.uah.edu/asef/index.html>.

2011 INTERNATIONAL SCIENCE AND ENGINEERING FAIR

An activity of Intel Science Service, 1719 N Street, NW, Washington, DC 20036, (202) 785-2255, FAX (202) 785-1243. Internet: <http://www.societyforscience.org/intelisef2011>.

The Intel 2011 ISEF will be held May 8-13, 2011 in the Los Angeles Convention Center, Los Angeles, California..

Virginia Vilardi, State Coordinator, 1251 Coosa River Parkway, Wetumpka H. S., 36092, (334) 567-5158, Cell, (334) 799-0104, FAX (334) 567-1178, (H) (334) 514-1770, Virginia.vilardi@elmore.k12.al.us.

Alabama Science Olympiad Report

For the last couple of years, Alabama educators have experienced some tough times due to Proration and budget cuts resulting in fewer teams registering, bad weather on the weekend of the tournament at University of Alabama Tuscaloosa and the tragedy at University of Alabama Huntsville could have resulted in two tournaments being cancelled. They rallied! The loyal Science Olympiad event judges, directors, volunteers and teams pulled it together to attend rescheduled tournaments. Alabama Science Olympiad Director is so thankful for the loyalty of everyone involved in the SO program.

Spring Hill College joined the SO Alabama family and conducted a fine tournament. The directors enthusiastically began plans for 2011 the day after their tournament. Two honor UAB students are volunteering to Co-direct a C tournament this year. They were encouraged by several science educators in the Birmingham area.

As for A2, the little Olympians, we have 62 teams registered as of January 1, 2011. Tournaments include University of West Alabama, Auburn University and Jacksonville High School. Needed is a host for an A2 tournament in the Birmingham area.

If we can keep the present folks hosting tournaments (three A2 tournaments, four B tournaments, and with UAB adding, four C tournaments) and add a few more, Alabama Science Olympiad numbers could rebound. In addition to the current regional hosts (UWA, AU, JHS, UAH, AUT, and SHC), I am very appreciative of directors and event supervisors at Huntingdon College for hosting the State B. We are still hopeful someone will agree to host the State C tournament. Registrations this year for B total 80 and 56 for C divisions.

Please consider showcasing your campus, staff and students, and the science department by hosting a tournament! As always, thank you for your support of Alabama Science Olympiad.

ALABAMA SCIENCE OLYMPIAD 2010-2011
Division A2 Grades 3-6 Olympiad Tournaments

University of West Alabama, Tuesday, Oct 19. Dr. Janis Beaird, Univ. of West Alabama, Station 7, Livingston, AL 35470, jbeaird@uwa.edu.

Jacksonville High School. February 26. David Peters, 1000 George Douthit Drive SW, Jacksonville, AL 36265. (256) 435-4177, www.esoatjhs.org

Auburn University, TBD. Greg Harris & Terry Tidwell, Department of Mathematics, 218 Parker Hall, Auburn, AL 36830 harriga@auburn.edu or tidweto@auburn.edu

Division B Grades 6-9 Olympiad Tournaments

Spring Hill College, February 26. Dr. Carolyn R. Simmons, Assistant Professor of Chemistry Spring Hill College, 4000 Dauphin Street, Mobile, AL 36608
csimmons@shc.edu

Auburn University, February 19. Dr. Steve Stuckwisch, Department of Geology, 108 Tichenor Hall, Auburn University, AL 36830. (251) 844-6575
sstuckwisch@charter.net; <http://www.auburn.edu/~stuckse/ScienceOlympiad/>

University of Alabama at Huntsville, February 19. Mrs. Vanessa Colebaugh, 5019 Willow Creek Drive, Owens Cross Roads, AL 35763. (256) 922-5747
nessacita@comcast.net, <http://www.uah.edu/sciolympiad/index.php>

University of Alabama. February 12. Luoheng Han, Ph.D., Associate Dean and Professor, College of Arts and Sciences, University of Alabama, Box 870268, Tuscaloosa, AL 35487-0268, Phone: 205.348.7007, Fax: 205.348.0272.
www.as.ua.edu

Division C Grades 9-12 Olympiad Tournaments

Spring Hill College. February 26. Dr. Carolyn R. Simmons, Assistant Professor of Chemistry Spring Hill College, 4000 Dauphin Street, Mobile, AL 36608
csimmons@shc.edu

University of Alabama Birmingham. February 26. Miss Charlotte Kent, Box 210, Blount Hall, 1001 14th St. S. Birmingham, AL 35205. cmckent@uab.edu

University of Alabama at Huntsville. February 19. Mrs. Vanessa Colebaugh, 5019 Willow Creek Drive, Owens Cross Roads, AL 35763. (256) 922-5747
nessacita@comcast.net, <http://www.uah.edu/sciolympiad/index.php>

University of Alabama. February 12. Dr. Luoheng Han, Associate Dean and Professor,
College of Arts and Sciences, University of Alabama, Box 870268, Tuscaloosa,
AL 35487-0268, Phone: 205.348.7007, Fax: 205.348.0272. www.as.ua.edu
Becky Snow Bsnow@eng.ua.edu

State Science Olympiad Tournaments B and C

Huntingdon College. March 12. Divisions B and C, Dr. Sidney Stubbs, Assoc. Vice
President for Institutional Assessment and Compliance and Professor of
Mathematics sstubbs@huntingdon.edu and Dr. Jim Daniels, Assoc. Prof. of
Biology, jdaniels@huntingdon.edu , 1500 E Fairview Ave, Montgomery, AL
36106 (334) 833-4430

2011 Science Olympiad National Tournament. May 18-21, 2011, University of
Wisconsin-Madison, Co-tournament Directors: Van Valaskey
veval@tds.net, Gary Graper graper@engr.wisc.edu 608-798-0240
<http://nso.wisc.edu/welcome.php>

State Director: Jane Nall, 31110 Wakefield Drive, Spanish Fort, AL 36527 (251) 621-2911,
email drnall@hotmail.com

Alabama Science Olympiad web page: <http://aso.jsu.edu/>

National Science Olympiad web page: <http://soinc.org/about>

Respectfully submitted,
Jane Nall, State Director

B-11

Counselor to AAAS Report

No report submitted.

B. 12. Section Officers
B-12, I

Biological Sciences Section Report

The final numbers for Section I presentations at the 2011 meeting at Jacksonville are:

A total of 39 presentations

19 oral paper presentations

6 student competition entries

Judges:

Ketia Shumaker

Lori Tolley-Jordan

David Nelson

Kristin Bakkegard

20 posters

10 student competition entries

Judges:

Megan Gibbons

Ketia Shumaker

Malia Fincher

Ken Marion

Because there are fewer than 12 participants in each of these competitions, we will give 1 award
for each “best student oral paper presentation” and “best student poster”.

Respectfully submitted,

Megan E. Gibbons, Section I Chair

B-12, II

Chemistry Section Report

No report submitted.

B-12, III

Physics and Mathematics Section Report

No report submitted.

B-12, IV

Engineering and Computer Science Section Report

We are pleased to have received 11 paper submissions and 4 poster submissions from a broad range of topics for our 2011 Section meeting.

Respectfully Submitted,
David Thornton

B-12, V

Social Sciences Section Report

There are seven papers and eleven posters scheduled for presentation in Section V – Social Sciences for the 88th annual meeting of the Alabama Academy of Science.

Respectfully submitted,
Richard A. Hudiburg, Chair

B-12, VI

Anthropology Section Report

No report submitted.

B-12, VII

Science Education Section Report

Three papers have been submitted for presentation in the Science Education section.

1. Astrobiology concepts integrated across the life sciences curriculum. *Roger A. Sauterer*, Dept of Biology, Jacksonville State University.

2. Development of a local comprehensive Alabama natural history program for adults. *Ellen W. McLaughlin*, Samford University.

3. In step with evolution: a classroom activity on DNA alignment and phylogeny reconstruction. *Jimmy Triplett*, Jacksonville State University.

Two posters have been submitted for presentation by their authors.

*4. Engaging the student: the use of modeling and technology in the science classroom. *Warren T Jones*, Gypsy A Abbott, and Stephen A Watts, University of Alabama at Birmingham.

5. Integrated learning: Troy University common reading initiative and principles of biology. *Michael Wayne Morris*, Neil Billington, Jamie Burchill, Jonathan Catrett, Elizabeth Ensor, Janet Gaston, and Christi Magrath, Dept. of Biological and Environmental Sciences, Troy University.

*Denotes presentation entered in competition

In the business meeting, a Vice Chair for the 2011-2013 term will be elected and a discussion of ideas for recruiting more paper and poster presentations from local teachers and college/university instructors.

Respectfully submitted,
Janet Gaston, Chair

B-12, VIII

Industry, Environmental, and Earth Science Section Report

No report submitted.

B-12, IX

Health Sciences Section Report

No report submitted.

B-12, X

Bioethics & History/Philosophy of Science Section Report

We will meet on Thursday, March 03, 1:00 p.m. to 5:00 p.m. at Jacksonville State University in Jacksonville, AL.

4 papers will be presented. They are:

Pluripotent stem cells: finally an ethically uncontroversial source?. *James T Bradley*, Auburn University.

Evolution and religion: parallels, problems, and histories. *Samuel J Hirt*, Auburn University.

The moral responsibility of scientists. *Gerard Elfstrom*, Dept. of Philosophy, Auburn University.

Science and mythology: dual belief systems? *Clark E Lundell* and James T Bradley, Auburn University.

There was one poster submission:

*The misconception of health disparities. *Sheryce C Henley*, Sonni-Ali Miller, Floyd Davis, Cedric Lane, Christopher Ragland, Will Tarver, Dr. Timothy Turner, Tuskegee University, Tuskegee, AL.

No student paper competition entries.

One travel award applicant.

At the business meeting, we will discuss ways to seek broader participation in our section meetings.

Respectfully submitted,
Gerard Elfstrom, Chair

B-13

Executive Director Report

Since the last Executive Committee Meeting, my activities have focused on the following:

1. Coordinated with Brian Toone to have on-line submission of paper/poster titles and abstracts and executive committee reports for the annual meeting.
2. Worked with the President, Vice President and 2nd Vice President to update all committee appointments.
3. Worked with section chairs and the local arrangements chair in the development of the program and program booklet for the 88th annual meeting of the Academy.
4. Forwarded a draft version of the program booklet to all presenters to check for accuracy of paper/poster listings.
5. Worked with presenters and the local arrangement chair in making changes to the program booklet.
6. Forwarded the final version of the program booklet to Brian Toone for posting on the

web on February 21, 2011 and forwarded the program to the local arrangements chair for printing.

7. Sent e-mails to all paper/poster presenters thanking them for their participation and notifying them of poster guidelines and the posting of the program on the web site.

8. Designed certificates for all Section paper/poster competition winners and forwarded the

template to George Cline for printing.

9. Prepared the banquet program.

10. Developed a doodle.com site for intended participation in the Executive Committee dinner and meeting.

11. Prepared the committee chair report compilation and action items for posting and availability at the Spring Executive Committee meeting.

12. Worked with a local auditing firm to do a comprehensive audit of the Academy's financial status and records.

Respectively submitted,

Larry K. Krannich

Executive Director

C. Committee Reports

C-1

Local Arrangements Committee Report

No report submitted.

C-2

Finance Committee Report

The assets of the Academy as reported at the Fall Executive Committee meetings and Annual Spring meetings since 2001 are listed below.

Period	Assets	Change	Period	Assets	Change
	(End of Period)			(End of Period)	
1/1 – 10/12/2001	\$71,763		1/1 – 12/31/2001	\$75,813	
1/1 – 10/12/2002	\$72,197	\$434	1/1 – 12/31/2002	\$72,813	–\$3,000
1/1 – 10/12/2003	\$71,403	–\$794	1/1 – 12/31/2003	\$74,800	\$1,987
1/1 – 10/26/2004	\$74,265	\$2,862	1/1 – 12/31/2004	\$74,610*	–\$ 190
1/1 – 10/26/2005	\$63,895	–\$10,370	1/1 – 12/31/2005	\$65,561*	–\$9,049
1/1 – 10/26/2006	\$62,162	–\$1,733	1/1 – 12/31/2006	\$67,555*	\$1,994
1/1 – 10/31/2007	\$34,004	–\$28,158	1/1 – 12/31/2007	\$36,435*	–\$31,120
1/1 – 10/10/2008	\$25,618	–\$8,386	1/1 – 3/13/2009	\$28,989*	–\$ 7,446
1/1 – 10/14/2009	\$26,937	\$1,319	1/1 – 3/23/2010	\$26,814*	--\$ 2,175
1/1 – 10/1/2010	\$22,144	--\$4,793	1/1 – 2/14//2011	\$24,864*	--\$1,950

Our finances may be stabilizing but still hover near a decade low. The Academy needs to maintain realistic budgets to reflect this and should be ready to consider steps (i.e., dues increase, increased meeting registration fees, etc.) to augment revenue in the near future.

Ken Marion

Chair, Finance Committee

*estimated

	C-3
Membership Committee Report	
No report submitted.	
	C-4
Committee on Research Report	
No report submitted.	
	C-5
Long-Range Planning Committee	
Since the spring 2009 Executive Committee meeting, the Long Range Planning Committee has presented for items for consideration. These are: 1) the realigning of the sections of the Academy; 2) guidelines for the focus and financing of awards from the Academy; 3) a modest dues increase; and 4) use of Facebook by the Academy. The Executive Committee approved the first three items and, where necessary, changes in the constitution were made. The fourth item (utilization of Facebook as a tool to attract members and to communicate about AAS) was discussed. No action was taken on this item.	
The Long Range Planning Committee will meet during the current 88th Annual Meeting in order to “brain-storm” on substantive issues to place before the Executive Committee for consideration at the fall 2011 meeting of the Executive Committee.	
Respectfully submitted,	
Adriane Ludwick, Chair Anne Cusic Ken Marion Eugene Omasta	
	C-6
Auditing, Senior Academy Committee Report	
Academy financial records are undergoing an outside audit.	
	C-7
Auditing, Junior Academy Committee Report	
No report submitted.	
	C-8
Editorial Board & Associate Journal Editors Committee Report	
No report submitted.	
	C-9
Place and Date of Meeting Committee Report	
The location for the 2012 meeting has been designated as Tuskegee University, but an exact date has not been established.	
To date, no potential hosts have volunteers to serve as the sites for the 2013, 2014, and beyond annual meeting of the Academy. Volunteers are urgently needed.	
	C-10
Committee on Public Relations Report	
No report submitted.	
	C-11
Archives Committee Report	
No report submitted.	

C-12

Committee on Science and Public Policy Report

No report submitted.

C-13

Gardner Award & Fellows Committee Report

The committee selected a Gardner Awardee for 2011, who is Dr. J. Michael Wyss. Dr. Wyss is the Director of the UAB Center for OutReach Development (CORD) and plays a highly significant role in engaging Birmingham metropolitan students in hands-on science activities through teacher training and collaboration with the McWane Science Center. The following individuals were selected as Fellows of the Alabama Academy of Science for 2011 and will be recognized at the banquet: James T. Bradley (Auburn University), Anne Cusic (University of Alabama at Birmingham), James B. McClintock (University of Alabama at Birmingham). All have distinguished themselves in science while residence of Alabama and in outstanding service to the Academy.

Respectively submitted,
Prakash Sharma, Chair

C-14

Carmichael Award Committee Report

Due to the late scheduled publication of issues 3 and 4 of Volume 81 of *The Journal of the Alabama Academy of Science*, the judging for the Emmett B. Carmichael Award for 2010 has been delayed.

The Committee will judge the published articles from the complete Volume 81 of the Journal. The decision of the committee will be communicated to the executive committee when it has been completed and the awardee(s) will be notified. Appreciation is extended to the other members of the committee: Robert Pitt of University of Alabama, Larry Davenport of Samford University, and David Nelson of University of South Alabama.

Respectfully submitted,
Richard A. Hudiburg, Chair

C-15

Resolutions Committee Report

The following resolution needs to be approved and presented at the banquet:

A Resolution of

Thanks to Jacksonville State University

To honor and recognize Jacksonville State University and the Local Arrangements Committee for their outstanding efforts in hosting the 2011 Annual Meeting of the Alabama Academy of Science, March 2-4, 2011.

Whereas, Jacksonville State University Professors Drs. George Cline, James Rayburn, and Mark Meade did chair the Local Arrangements Committee and coordinated all arrangements for the highly successful 2011 meeting. Whereas, Jacksonville State University Administration did support the meeting with superb facilities in Martin Hall and the Houston Cole Library Whereas, Jacksonville State University did provide outstanding hospitality throughout the meeting Whereas, Jacksonville State University faculty and staff generously provided their time to assure the success of the meeting Whereas, Jacksonville State University did coordinate an excellent awards banquet

Now, therefore, Be it resolved by the Alabama Academy of Sciences Resolution Committee, its executive committee concurring:

That the membership of the Alabama Academy of Sciences, by this resolution, honors and recognizes Jacksonville State University and the local arrangements committee for their outstanding efforts in organizing and conducting the 88th Annual meeting of the Alabama Academy of Sciences, March 2-4, 2011. Be it further resolved that a copy of this resolution be forwarded to Jacksonville State University.

C-16

Nominating Committee Report

Officers

Position	Term End	First Name	Last Name	Motion & Comment
Second Vice-President	2011	Emmanuel	Waddell	accepts nomination
State Counselor to the Junior Academy 2011 C		atherine	Shields	re-appointment
Trustee	2011	Ken	Marion	re-appointment
Trustee	2011	Prakash	Sharma	re-appointment
Trustee	2011	James	Bradley	no reply
Trustee	2011	David	Nelson	no reply
Associate Counselor to the Junior Academy 2012		Mary	Williams	accepts nomination

Committees:

Committee Position First Name Last Name Term Ends Motion & Comment

Archives Chair Troy L. Best 2011 reappointment
Auditing Senior Academy Chair Robert Angus 2011 reappointment
Auditing Junior Academy Henry Barwood 2011 no reply
Auditing Junior Academy Govind Menon 2011 reappointment
Budget and Finance Chair Ken Marion 2011 reappointment
Budget and Finance Ellen Buckner 2011 reappointment
Budget and Finance Brian Burnes 2011 reappointment
Budget and Finance Mickie Powell 2011 reappointment
Budget and Finance Janie Gregg 2011 reappointment
Budget and Finance Bettina Riley 2011 reappointment
Budget and Finance Catherine Shields 2011 reappointment; interim basis
Editorial Board: (staggered 3-yr terms) Prakash Sharma 2011 reappointment
Electronic Media: (3-yr terms) Associate Editor Richard Hudiburg 2011 reappointment
Electronic Media: (3-yr terms) Associate Editor vacant
Emmett B. Carmichael Award: (staggered 2-yr terms) vacant
Gorgas Scholarship Program: (staggered 3-yr terms) Prakash Sharma 2011 reappointment
Gorgas Scholarship Program: (staggered 3-yr terms) Diane Tucker 2011 reappointment
Gorgas Fellow Mark Jones 2011 reappointment
Junior Academy: Chair Catherine Shields 2011 reappointment; interim basis
Local Arrangements at Tuskegee University Chair Prakash Sharma accepts nomination
Local Arrangements at Tuskegee University Vice Chair Akshaya Kumar accepts nomination
Long Range Planning: (staggered 4-yr terms, committee elects chair) Eugene Omasta 2011 no
reply

Mason Scholarship (staggered 3-yr terms) Jane Roy 2011 no reply

Place and Date of Meeting:

(5 members, staggered 5-yr terms) Larry Krannich 2011 reappointment
 Public Relations: (staggered 4-yr terms) vacant
 Public Relations: (staggered 4-yr terms) Ellen Buckner 2011 reappointment
 Public Relations: (staggered 4-yr terms) Ken Marion 2011 reappointment
 Regional Science Fairs: Chair Virginia Valardi 2011 reappointment
 Research: (5 members with staggered 5-yr terms) Chair George Cline 2011 reappointment
 Research: (5 members with staggered 5-yr terms) Yong Wang 2011 reappointment
 Science and Public Policy: Chair Scott Brande 2011 reappointment
 Science and Public Policy: Steven Carey 2011 no reply
 Science and Public Policy: Boakai Robertson 2011 no reply
 Science and Public Policy: James Bradley 2011 no reply
 Science Olympiads: Chair Jane Nall 2011 reappointment
 Steering: Brian Thompson 2011 reappointment
 Steering: Bettina Riley 2011 reappointment
 Steering: Janie Gregg 2011 reappointment
 Place and Date of Meeting: (5 members, staggered 5-yr terms) Chair vacant vacant 2012 vacant
 Budget and Finance David Frings accepts nomination
 Gorgas Scholarship Program: (staggered 3-yr terms) Vacant vacant vacant
 Gorgas Scholarship Program: (staggered 3-yr terms) vacant vacant vacant
 Regional Counselors: Vacant vacant
 Regional Counselors: vacant vacant
 Regional Counselors: Vacant vacant vacant
 Regional Counselors: Vacant vacant vacant
 Resolutions: Ketina Schumaker accepts nomination

Respectfully submitted,
 Ron Hunsinger, Second Vice President

C-17

William H. Mason Scholarship Committee Report

This year we have had six complete applications submitted for the \$1,000 William H. Mason Fellowship. The Committee reviewed the application material and selected Cory Goble as the 2011 scholarship recipient. He will be enrolling in the Alternative Masters Program in Education at the University of Montevallo.

I greatly appreciate the service of reviewing in the applications performed by Committee members Mel Blake, Malcolm Braid, Loretta Cormier, Charles Eick, and Jane Roy.

Respectfully submitted,
 Michael B. Moeller, Chair

C-18

Gorgas Scholarship Committee Report

In 2011, the Gorgas Scholarship Competition continued to seek ways to grow the organization of science clubs and entrants to the competitions. Mark T. Jones, PhD, NBCT, began the year as the AJAS-Gorgas Teacher Fellow. He presented sessions at the Alabama Science Teacher Association meeting and has worked to develop connections in several areas.

His report and upcoming plans are attached.

This year, one Gorgas Finalist is a semi-finalist in the national Intel Science Talent Search.

Numerous scientists participated as judges in paper reading preliminary scoring and others will be judging the final competition. Thanks to all for their efforts on behalf of the Gorgas Scholarship Competition. The finals of the Gorgas Competition will be held Friday, March 4th, in 11th Floor, Houston Cole Library on the Jacksonville State University campus. The competition will begin at 8:00 and awards announced at the Awards reception at 3:00 pm.

Members of the AAS are invited to view the Gorgas posters during the lunch session from 12:00-1:00. The Committee would like to thank Dr. George Cline for his excellent assistance in preparations for the Gorgas competition and recruitment of judges from Jacksonville State University.

We have received the offer of additional scholarships from Samford University and they have been added to the list. We also received an increase of the scholarship from Auburn University. Both of these include a full tuition scholarship for the winner of the Gorgas Competition. Thank you to these institutions!

The Committee would like to recognize the many outstanding teacher-sponsors of the students. Their work in encouraging students to enter the competition is instrumental to both the success of the program and to the success of the students.

Respectfully submitted,
Ellen Buckner, Chair

C-19

Electronic Media Committee Report

Website:

I have made a number of routine updates to the website (announcements, etc...) as well as these below:

Spring Executive Report Submission Page

I updated the report submission page to gather reports for this Spring 2011 executive meeting.

Online Membership Application

As of Tuesday, February 22nd, **99 people** have up-to-date memberships through the paypal system. Of these, there are 25 people whose membership will expire before April 2011.

Current PayPal balance: **\$2,202.35**

Respectfully submitted,
Brian Toone
Electronic Media

D

D. Old Business

E

E. New Business

Discussion of the current AJAS situation and absence of funding from JSHS for 2011.

F

F. Adjournment

Minutes of the Annual Business Meeting
Alabama Academy of Science
Thursday, March 3, 2011
Jacksonville State University

Bryan Burns, President brought the Annual Business meeting to order.

The motion to transition to an e-journal while still printing a few copies for the libraries and our archives carried. This will begin the next journal issue and will be produced in-house by Brian Toone in collaboration with the Journal editor. The slate of officers and committee appointments was presented and approved. The 2nd Vice President is Emmanuel Waddell, Professor of Chemistry, University of Alabama in Huntsville. The Junior Academy paper reading and competition shortfall for sending students to the San Diego meeting was presented and discussed. The senior academy will assist with some of these expenses as efforts are made to find funds from various sources. Several members pledged \$100 tax-deductible donations and challenged others to do the same. The Steering Committee will determine the final allocation needed to support the students to the national competition New Business: Dr. Mark Jones, Gorgas teacher fellow, is working on an AMSTI affiliate status. AMSTI does two year training programs for high school science teachers and the desire is to create a third year program. The goal is to generate publicity through AMSTI and on professionalism for the Academy. Mark will set up a table at the Science Olympiad to give information about the Junior Academy to build participation.

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